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JULY - SEPTEMBER

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WORLD'S POULTRY SCIENCE ASSOCIATION

Volume 7 - Number 3

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WORLD'S POULTRY SCIENCE JOURNAL

Volume 7 July-September Number 3

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GUSTAVE F. HEUSER

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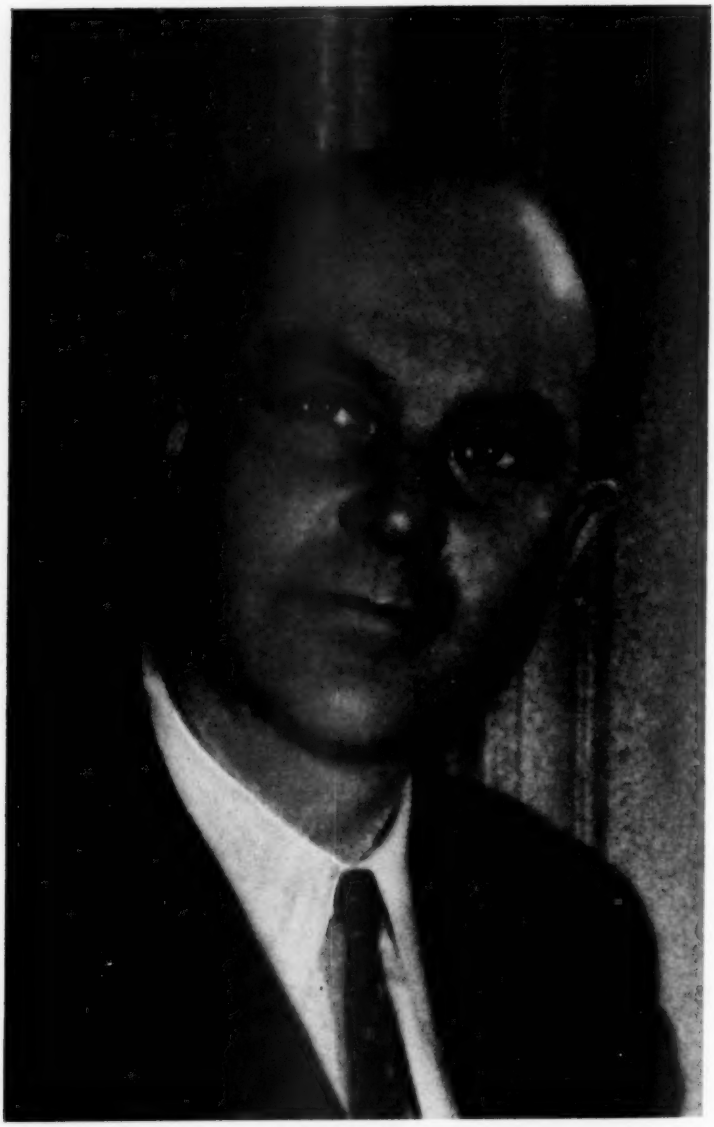

ALEX WILTZER

Newly elected President of the World's Poultry Science Association for 1952-1954

NINTH WORLD'S POULTRY CONGRESS A SUCCESS

The Ninth World's Poultry Congress held at Paris, France, August 2nd-9th, 1951, was generally acknowledged as successful and thus joins its predecessors in making a definite contribution to the advance of the world's poultry industry.

It was felt that this Congress strengthened the aims as developed at the previous World's Poultry Congresses. The aims of the World's Poultry Congresses as expressed by President Alex Wiltzer are: to promote friendly relationship among all people interested in poultry farming and to encourage international contacts; to stimulate scientific research and the instruction of poultry farming by means of reports, discussions and expositions to encourage production, commerce and consumption of poultry products on a national and international level. The aim further is to spread throughout the whole world the interest poultry farming represents and to attract the attention of all those interested in breeding to the most modern and rational methods used in different countries of the world.

The following countries participated in the Congress: Australia, Brazil, Belgium, Canada, Chile, Denmark, Dominican Republic, Finland, France, Great Britain, Iceland, India, Iraq, Ireland, Israel, Italy, Luxembourg, Malta, Mexico, Netherlands, Norway, Pakistan, Portugal, Saar, Salvador, South Africa, Southern Rhodesia, Spain, Sweden, Switzerland, United States of America, Uraguay and Venezuela. About 1600 members were registered from these countries. The largest delegation came from Great Britain with a representation of nearly 300.

The meetings of the Congress were appropriately held in the historic and magnificent buildings of the Sorbonne. Impressive opening and closing sessions were held in the great amphitheatre of the Sorbonne. Monsieur Pierre Pflimlin, Minister of Agriculture, presided at the official opening.

The mornings were devoted to the delivery of papers at the sectional meetings of the Congress. There were a total of 139 papers as follows: General reports at the plenary session—5, Genetics and Incubation—21, Nutrition, Physiology and Rearing—37, Investigations of Diseases and Their Control—39, Economic Problems—19, Education and Organization—18. These papers were prepared by authors from the following countries: Germany—2, Australia—2, Belgium—11,

Canada—8, Denmark—5, Spain—14, United States—23, Finland—1, France—16, England—27, Israel—1, Ireland—1, Italy—10, Norway—1, Netherland—8, Sweden—3, Switzerland—6.

The afternoons were devoted chiefly to becoming acquainted with Paris and its surroundings and with the French people. There were included visits to breeding centers, markets and cold storage warehouses and the veterinary school at Alfort. A long to be remembered Sunday afternoon and evening were spent at Versailles. The afternoon was devoted to inspection of the famous palace and gardens. In the evening we were privileged to witness the night festival on the waters of the Versailles Parc. This included an unsurpassed display of lights on Neptune's' Fountain, fireworks and beautiful dancing all staged in a superb natural outdoor setting.

Social activities were not overlooked. One of the important benefits of the World's Poultry Congress is to become better acquainted with and to have a fuller understanding of fellow workers from other lands. A reception in the Town Hall of Paris (Place de l'Hotel d'Ville) by the City Council gave a first opportunity to meet old friends and to make new acquaintances in a very fitting environment and atmosphere. An afternoon garden party gave further opportunity to mingle socially. A high spot of the social activities was the reception of official delegates at the Elysee by Monsieur Vincent Auriol, the President of the French Republic. An evening reception in the illuminated halls of the Louvre gave the Congress members a special opportunity to inspect the statuary of this famous museum. A special program for the ladies was arranged by the Ladies' Reception Committee. Besides visiting many points of interest in Paris they had the opportunity of attending a specially arranged fashion show. The climax of the social events was the official banquet and gala evening of the Congress held in the very fine ballroom of the Palais D'Orsay Hotel.

The World Poultry Exposition, under the general supervision of Monsieur G. Baget, was held in the "Parc des Expositions" at the "Porte de Versailles." Educational exhibits, commercial exhibits, and a live poultry show consisting of representative birds from the various countries were very attractively portrayed. The Exposition was officially opened and inspected by Monsieur Vincent Auriol, the President of the French Republic.

The World's Poultry Science Association, the organization which sponsors the congresses, also had one of its most successful triennial meetings with about 200 members present. There was a general feeling that this organization is, and should be, the leader in promoting the welfare of the poultry industry of the world. A number of resolutions were adopted at the meeting of the World's Poultry Science Association and presented at the closing session on behalf of all of the members of Congress. (See Report of Triennial meeting of the World's Poultry Science Association).

In order to enable the guests from abroad to become more familiar with French agriculture several post-congress trips were arranged. These gave the participants opportunity to gain first hand information and observation regarding poultry breeding farms and educational and industrial institutions. In addition the excursions enabled visits to places of special tourist, historic and scenic interest.

This Congress has again demonstrated the fact that with a common interest (in this case the little hen) and with a desire to understand each other there can be international peace and understanding.

G. F. Heuser

MEETING OF THE COUNCIL OF THE WORLD'S POULTRY SCIENCE ASSOCIATION

A meeting of the Council of the World's Poultry Science Association was held at the Grand Hotel, Paris, France, August 4, 1951. The following members were present:

Mr. W. D. Termohlen (U.S.A.) (President) (in the Chair); Mr. W. A. Kock (Denmark) and Professor A. Ghigi (Italy) Hon. Past Presidents; Messrs. H. Engler (Switzerland), C. S. Th. Van Gink (Holland) and Mr. A. Wiltzer (France) Vice-Presidents: Dr. F. Lievens and Mr. J. van Ingelgem (Belgium); Professor J. R. Cavers (Canada); Professor V. Adsersen and Mr. Oluf Nielsen (Denmark) Mr. D. J. G. Black, Dr. W. P. Blount, Dr. R. Coles, Dr. R. F. Gordon, Mr. E. T. Halnan and Mr. G. R. H. Nugent (England and Wales); Mr. P. Waroquiez (France); Mr. J. G. Tukker (Holland); Mr. D. Philpott and Miss Jane Cox (Ireland); Professor Anita Vecchi (Italy); Dr. J. G. Rynehart (Northern Ireland); Miss M. M. Macleod and Mr. J. E. Wilson (Scot-

land); Professor Nils Olsson and Mr. E. Haeggblom (Sweden); Mr. H. Ebbell and Mr. H. Kleb (Switzerland); Mr. H. H. Alp and Dr. O. B. Kent (U.S.A.); Dr. G. F. Heuser (U.S.A.), Treasurer and Assistant Secretary; Major Ian Macdougall (England), Secretary and Assistant Treasurer.

Apologies for non-attendance were submitted from Mr. G. L. Landon (Canada), Dr. L. de Blieck (Holland), Mr. J. H. Kissling (New Zealand), Miss M. J. Sheedy (Northern Ireland), Dr. A. W. Greenwood (Scotland), Dr. Morley A. Jull (U.S.A.), and Professor J. E. Rice (U.S.A.).

MINUTES

The Minutes of the meetings held on 25th and 27th of August 1948, having been circulated, were confirmed and signed.

PRESIDENT'S REPORT

The President drew attention to the fact that the Association had now members in 62 countries and that the present membership was three times as large as it was in 1939. He pointed out that in that year there were 393 Patrons, Affiliations and individual Members in 1948 there were 787 and at 30th June 1951 there were 1,311. He further pointed out that, while he in no way desired to make invidious comparisons, he would like to draw attention to the fact that the United States had now a membership of 480 and the United Kingdom of 341 and added that he was not satisfied with the position in his own country. He urged upon all countries that greater effort should be made to increase membership and pointed out that individual membership could be held by any person who is or had been engaged in any activity connected with the Poultry Industry—producers, hatcherymen, feed merchants, packers, research workers, scientists, those engaged in marketing and publicity, etc.

Mr. Termohlen stated that he wanted to especially commend the work of the Secretary and of the Treasurer and added, "Without their fine cooperation and hard work the present record of progress could not have been attained." He added that he would always have very pleasant memories of the time during which he held the position of President of the Association.

SECRETARY'S REPORT

A report (attached) covering the period August 1948 through June 30, 1951, was presented by the Secretary. Dr. Coles moved its adoption which was seconded by Professor Cavers and was approved unanimously.

TREASURER'S REPORT

Statements of Receipts and Expenditure for the period 1st January through 30th of June, 1951, duly audited, reflecting credit balances of $2,639.75 and £1138-13-2, were submitted by the Treasurer and Assistant Treasurer. On the proposition of Mr. E. T. Halnan, seconded by Mr. H. H. Alp, the Statements were approved.

THE WORLD'S POULTRY SCIENCE JOURNAL

The Editor, in his Report, stated that the Journal had appeared at the usual quarterly intervals since his previous Report and that 1800 copies of the April-June, 1951 issue had been printed. He expressed a sincere appreciation of the help received from Mr. J. W. Kinghorne who had been responsible for the compilation of the abstracts appearing in the section dealing with the "Review of Poultry Publications" and from Professor W. C. Thompson who had been reviewer for the "World's Poultry Science Library" section. He pointed out that under the active direction of Dr. O. B. Kent, the Advertising Committee had secured enough advertising matter to carry a considerable portion of the expense of the Journal which had been of considerable financial help, a fact that was much appreciated.

In commenting upon the Report, Mr. Nugent expressed the appreciation of all the Members of Council for the very excellent work done by Dr. Heuser as Editor of the Journal and pointed out that the Journal had now a world-wide reputation and was of inestimable value to all engaged in the Poultry Industry throughout the World.

It was agreed that the President should forward a letter to the Dean of the New York State College of Agriculture, Cornell University embodying the Council's appreciation of Dr. Heuser's' invaluable work as Editor and that he would be permitted to continue his good work.

RESOLUTIONS

Report was submitted of the action taken in connection with the four resolutions approved at the Triennial meeting of the Association held in Copenhagen in August 1948.

Resolution No. 1 was concerned with the adoption of an international Standard of Vitamin D used for poultry.

Report presented by Mr. E. T. Halnan:

> "I have the honour to report that since this resolution was passed by the W.P.S.A. an international standard based on crystalline vitamin D_3 has been adopted by the

appropriate authorities, furthermore, the potency of vitamin D_3 carriers is expressed in terms of weight.

"The new International Standard consists of a preparation of crystalline vitamin D_3 held at the National Institute for Medical Research, London, and replaces the existing solution of irradiated ergosterol.

"The International Unit of vitamin D is the vitamin D activity of 0.025 micrograms of the International Standard preparation of crystalline vitamin D_3. It is recommended that the Standard should be issued as a solution containing 1000 I.U. per gram.

"In the United States this Standard now replaces the U.S.P. reference oil which previously formed the Standard in the U.S.A.

"As a result of this action by the appropriate authorities the confusion caused by the previous practice of adopting varying national Standards of vitamin D used for poultry has now been removed."

Resolution No. 2 was concerned with achieving uniformity in egg laying standards throughout the world.

Report presented by Mr. C. S. Platt, Chairman of Egg Laying Test Committee:

"Copies of the rules and regulations governing all the known egg laying tests in the world have been collected in the office of the Chairman. A summary of these regulations was prepared and published in the World's' Poultry Science Journal, Vol. 6, No. 4, October-December 1950. A report on official production records of the various tests is now in preparation.

"Since this committee was officially appointed after the meeting of the previous World's Poultry Congress in Denmark, there never has been a meeting of the Committee. Such a meeting, however, is to be held during the sessions of the World's Poultry Science Association in Paris, and in the absence of the chairman will be presided over by Dr. R. George Jaap."

Resolution No. 3 was concerned with the suggested search for specimens of wild breeds of poultry. Owing to the difficulty of the International situation it was not possible to take any action.

Resolution No. 4 was concerned with a recommendation in regard to the desirability of preparing standards and grades for eggs and poultry and for containers which would be suitable for general acceptance.

A copy of an Interim Report prepared by Mr. S. C. Barry, Chairman of the Grade Standards Committee, is attached. In his covering letter submitting this Report, Mr. Barry said that while there appeared to be distinct differences of opinion in different areas with respect to the nature of the recommendations which should be made for model grade standards, he was sufficiently convinced of the sincerity and ability of the people making up the Committee to feel that with careful study and with time for the various members to understand the different points of view, that some reconciliation of the different views could be made. He expressed the sincere hope that the Committee could be continued with its present members and with equal sincerity and, while he had no objection to continuing in the capacity of Chairman, he conscientiously felt that someone closer to and with a better understanding of the European picture could probably do a more effective job as Chairman.

BRANCH ORGANIZATIONS

It was reported that, as a result of a postal ballot of the Council, an application for the approval of the setting up of a Branch of the Association in Holland and its Constitution were approved.

An application for the setting up of a Branch in Switzerland and the approval of its Constitution was approved subject to the addition of a clause providing that any person could be a member of the Association without being a member of the Branch.

CONSTITUTION

The recommendations of the Committee set up at the 8th World's Poultry Congress to revise the Constitution were finally approved by the members of the Association and came into operation in 1950, when Dr. G. F. Heuser assumed the position of Treasurer and Assistant Secretary and Major Ian Macdougall that of Secretary and Assistant Treasurer.

In the short time during which the new Constitution has been in operation it has become apparent that one or two minor points in some of the Articles require amendment and clarification and it was decided to set up a small Committee consisting of Dr. Heuser, Mr. C. S. Van Gink and the Secretary to give consideration to a further revision and report.

WORLD'S POULTRY CONGRESS

(a) Invitations for the holding of the 10th World's Poultry Congress in 1954 were received from Belgium, Scotland and Sweden. It was agreed, in terms of Article XII of the

Constitution that negotiations should be opened with the Governments of these countries in the following order:—Scotland, Belgium and Sweden.

(b) Consideration was given to a resolution received from the United Kingdom Branch that the following classification of the Papers Section be adopted at future Congresses:

Section 1. Genetics and breeding
2. Physiology and nutrition.
3. Disease and its control.
4. Organization, education and economics.
5. Husbandry.

It was decided to set up a Committee consisting of the following members:—Dr. R. Coles (Chairman), Professor J. R. Cavers, Dr. F. Lievens and Mr. J. G. Tukker to consider the resolution and submit their recommendations to the Triennial meeting of the Council to be held on 9th August, 1951.

MEMBERSHIP

The following resolution received from the United Kingdom Branch was unanimously approved.

"That bona fide poultry students at Colleges, Universities and Agricultural Institutes should be eligible for Associate membership of the Association at half the current annual subscription during their studentship."

COUNCIL

It was unanimously agreed to approve an application, submitted by Germany, for representation on the Council.

ELECTION OF OFFICERS

Nominations were presented and elections according to the Constitution were made as follows:

(a) *President*: Mr. A. Wiltzer (France).

(b) *Vice-Presidents*: Dr. F. Lievens (Belgium), Dr. R. Coles (England), Mr. C. S. Th. Van Gink (Holland), Mr. H. Engler (Switzerland) and Mr. Jos. Wm. Kinghorne (U.S.A.).

(c) *Secretary and Assistant Treasurer*: Major Ian Macdougall (England).

(d) *Treasurer and Assistant Secretary*: Dr. G. F. Heuser (U.S.A.).

(e) *Honorary Past President*: Mr. W. D. Termohlen (U.S.A.).

ELECTION OF COUNCIL

The following were elected Members of Council for the period (6 years) commencing 1st January 1952.

Australia—Mr. R. W. Kurrle

Belgium—Professor R. Willems

Canada—Mr. G. L. Landon
Denmark—To be filled
England and Wales—Mr. C. Horton-Smith, Dr. S. K. Kon, Mr. W. Marshall and Mr. K. Wilson
Finland—To be filled.
Germany—Professor Dr. H. Havermann
Holland—Professor L. de Blieck
India—To be filled.
Israel—Mr. A. Livshutz
Norway—Mr. Lief Svendsen
Pakistan—Mr. Nurul Islam
Scotland—Mr. J. E. Wilson
South Africa—Professor A. M. Gericke
Spain—Mr. Luis Latorre
Sweden—Mr. E. Haeggblom
Switzerland—Mr. H. Kleb
U.S.A.—Dr. C. D. Carpenter, Mr. R. M. Hanson, Dr. R. J. G. Japp, Dr. M. A. Jull and Mr. J. D. Sykes

The following were elected Members of Council for the period (3 years) commencing 1st January, 1952:

Germany—Dr. A. von Burgsdorff-Garath
U.S.A.—Mr. R. R. Hannas and Mr. M. C. Small

OTHER BUSINESS

Three resolutions were submitted from the Swiss Branch dealing with the following:

(a) International Standards for White Leghorns, Rhode Island Reds and White Wyandottes.
(b) The organization of an international poultry exhibition at future Congresses.
(c) Official languages at future Congresses.

It was agreed that these resolutions should be brought up in the appropriate Papers Sessions of the Congress.

ADJOURNMENT

In closing the meeting, the President thanked the Officers and Members of Council for the unstinted support and loyal cooperation they had given him during his term of office. He said that he would always have very pleasant recollections of their association. He would always be proud of and also thankful for the opportunity of serving the Poultry Industry during his term of office as President. He also stated that he would do all in his power to further the interests of the Association in the years that lay ahead and he asked all Members to do likewise.

Major Ian Macdougall, Secretary

REPORT OF THE SECRETARY OF THE WORLD'S POULTRY SCIENCE ASSOCIATION

(presented at the Meeting of the Council held August 4, 1951 in the Grand Hotel, Paris, France.)

The resumption of the activities and the extension of the membership of the Association, stimulated by the holding of the 8th World's' Poultry Congress at Copenhagen, have continued with unabated momentum. It is pleasing to record increases in both affiliations and memberships. For comparative purposes a detailed analysis of the figures for the different countries for 1939, 1948 and 1951 (30th June) is attached to this Report. Despite these increases it is a sad reflection in the spirit of the millions throughout the world engaged in the Poultry Industry and its ancillary activities that only 1311 think it worth while to support the leading international Poultry Organization, one of whose main objects is to "facilitate in all possible ways the exchange of knowledge and experience among persons in all parts of the world who are contributing to the advancement of all branches of the Poultry Industry." It is beyond doubt that the work of the Association must ultimately benefit every individual engaged in the Poultry Industry and its ancillary services—everyone, whatever their job, whatever their branch, wherever they are. The President is to be heartily congratulated on the great success of his personal efforts to increase the affiliations in his own country. This emphasizes what can be done by personal effort. The very warm thanks of the Council are due to the following members for their invaluable assistance in collecting the annual fees and extending membership in their respective countries: Messrs. J. Van Ingelgem (Belgium), V. Hagerup (Denmark), A. Wiltzer (France), R. Fangauf (Germany), P. Ubbels (Holland), Prof. A. Ghigi (Italy), Messrs. Leif Svendsen (Norway), L. Latorre (Spain), S. Traskman (Sweden), Harald Ebbell (Switzerland).

BRANCH ORGANIZATION

The example set by the United Kingdom in 1946 in forming a branch of the Association has now been followed by Holland and Switzerland. As a result of a postal ballot the formation of the Afdeling Nederland van the W.P.S.A. and its Constitution were approved. An application for the approval of the formation of a Branch in Switzerland has been received and will come before the Council for approval at its meeting in Paris.

The United Kingdom Branch is now firmly established and has a paid-up membership of 341. It holds at least two whole-day conferences each year at which prominent members of the scientific section of the poultry industry submit papers which are followed by discussions. Every member of the Branch gets a copy of each paper submitted. It is hoped that those countries where branches have not yet been formed will give this important matter careful consideration. The first aim, however, should be to increase the membership in their respective countries to such a total as will warrant the creation of a branch.

REVISION OF THE CONSTITUTION

The recommendations of the Committee set up at the 8th World's Poultry Congress to revise the Constitution were finally approved and came into operation in 1950, when Dr. G. F. Heuser assumed the position of Treasurer and Assistant Secretary and Major Ian Macdougall that of Secretary and Assistant Treasurer.

In the short time during which the new Constitution has been in operation it has become apparent that one or two minor points in some of the Articles require clarification and your Secretary suggests that a small sub-Committee should be appointed to re-examine the Constitution and submit its recommendations to the Executive Committee for approval and thereafter to submit them to the members of the Association as provided in Sections 6 to 8 of the By-Laws.

FINANCES

Audited accounts to 30th June 1951 will be presented by the Treasurer and Assistant Treasurer to the Council at its meeting in Paris. (The Annual financial statements will be published in the Journal.)

WORLD'S POULTRY SCIENCE JOURNAL

At the meeting held at Copenhagen on 25th August 1948, the Council placed on record its keen appreciation of the excellent work done by Dr. Heuser as Editor of the Journal. Dr. Heuser has continued his excellent work and the Journal is becoming of greater use than ever to the scientist and the practical poultry keeper alike.

The Council is grateful to the members of the Publication and Advertising Committee for the valuable assistance they have rendered in connection with the publication of the Journal.

WORLD'S POULTRY CONGRESS

To date, no invitations have been received in connection with the holding of the 10th World's' Poultry Congress in 1954.

OBITUARY

Since the last Congress the Association has suffered the loss of two of its oldest members. Professor Salvatore Castello (Spain) and Chevalier Voitellier (France). In their particular spheres these two gentlemen rendered invaluable service not only to the poultry industry of their respective countries but to the world at large and they will be sadly missed.

MEMBERSHIP

Patrons	*1939*	*1948*	*1951* (30 June)
Countries	8	8	8
Affiliations			
Australia	1	2	4
Canada	1	—	—
Denmark	1	1	2
England	1	4	5
France	1	2	2
Germany	1	4	—
Pakistan	—	—	1
South Africa	—	—	1
Spain	—	—	1
Sweden	—	—	1
Switzerland	—	2	6
U.S.A.	6	8	157
	12	23	180
Members			
Algeria	1	1	1
Argentina	2	1	—
Australia	9	15	19
Austria	—	3	1
Belgium	17	22	27
Bohemia and Moravia	4	—	—
Brazil	2	1	4
British West Africa	—	1	1
Bulgaria	3	1	—
Canada	20	30	44
China	—	1	1
Columbia	—	—	2
Costa Rica	—	1	1
Cuba	1	1	—
Czechoslavakia	—	2	—
Denmark	16	13	26
East Africa	—	—	1
Egypt	2	—	1
Eire	6	6	17
El Salvador	—	1	—
England	43	241	284
Finland	2	1	5
France	17	21	18
Germany	36	24	44
Haiti	—	1	—
Hawaii	—	—	1
Holland	22	22	55
Hungary	—	2	—
India	3	4	5

Indonesia	—	—	1
Iraq	1	1	—
Israel	—	—	9
Italy	16	16	15
Japan	2	—	1
Jordan Kingdom	—	—	1
Latvia	1	—	—
Luxembourg	—	1	2
Malaya	—	1	1
Malta	—	1	1
Morocco	1	—	—
Netherland East Indies	1	—	—
New Zealand	4	4	6
Northern Ireland	4	7	14
Norway	3	1	12
Pakistan	—	2	10
Palestine	16	14	—
Peru	2	1	—
Philippine Islands	—	2	1
Poland	3	7	1
Puerto Rico	—	1	1
Republica Dominicana	—	1	1
Scotland	3	20	39
Siam	—	—	1
South Africa	20	3	17
Southern Rhodesia	—	—	1
Spain	3	3	12
Sweden	5	6	40
Switzerland	9	11	47
Turkey	1	1	2
U.S.A.	69	231	323
Uruguay	3	2	2
Wales	—	3	4
	373	756	1,123
Summary			
Patrons	8	8	8
Affiliations	12	23	180
Members	373	756	1,123
Total Membership	393	787	1,311

Major Ian Macdougall, Secretary

INTERIM REPORT OF THE EGG GRADE STANDARDS COMMITTEE

The terms of reference of this Committee require it to draft grade standards for poultry products which it can present to the World's Poultry Science Association and which the Association, if it approves, can recommend as standards for international use.

This is an interim report from the Chairman, on Committee activities, for the Paris Congress.

In organizing the committee it was considered that all countries which had membership in the Association, and particularly the more important countries in egg production and marketing, should be represented on the committee. The time required to organize it, to secure acceptance of memberships, to prepare basic data for committee members, and to conduct

correspondence to many countries, along with some delinquency on the part of the Chairman, have resulted in rather less progress being made to this time than had been hoped.

The Committee includes persons who are recognized authorities in the field in their respective countries. Their task, to reconcile the various grading systems in use in different parts of the world, into one which can meet general acceptance, is a difficult one. I am convinced, however, that if that can be achieved there is no group better qualified to do it than that represented on this committee.

To date, the committee has considered two main subjects—weight grades for eggs and quality grades for eggs. These in fact, are the two main matters with which it has to deal in recommending model grade standards for eggs to the Association. The results of the committee's work to date on each of these two matters are stated below.

The views of the committee with respect to standard weight grades may be summarized as follows:

1. There is agreement that individual egg weights should constitute the basis of weight grades.
2. There is general acceptance of grams as a basis of measurement, it being pointed out that English speaking countries could, if they wished, use corresponding avoirdupois figures.
3. There is a difference of opinion as to the desirable number of grades and the weight basis for each. These differences reflect the three main systems in use in different areas:
   (a) *The European system*—grades are based on grams with five gram intervals. These serve the European trade and agree closely with the commercial British designations in pounds per long hundred (120 eggs). The full range of grades which would suit committee members in this group are stated below in grams per egg, with the equivalent figures in ounces per egg and per dozen and pounds per long hundred shown for comparison purposes:

grams per egg	ounces per egg	ounces per doz.	lbs. per 10 doz.
under 40	under 1.410	under 16.92	—
40-45	1.410-1.586	16.92-19.05	—
45-50	1.586-1.763	19.05-21.16	12.5
50-55	1.763-1.939	21.16-23.27	14
55-60	1.939-2.115	23.27-25.38	15.25
60-65	2.115-2.291	25.38-27.49	16.5
65-70	2.291-2.468	27.49-29.61	18
over 70	over 2.468	over 29.61	—

It should be pointed out that not all committee members from this area want the full eight grades, some being prepared to eliminate the first two and the last.

(b) *The official British system*—whereas the Commercial British trade import eggs in five weight groups (in pounds per 10 dozen) as shown in (a) above, the official British grading system provides for four weight grades in terms of ounces per dozen. These are listed below, with the equivalent figures in grams per egg shown for comparison purposes:

Grade	ounces per egg	grams per egg
A	not less than 2-3/16	not less than 62
B	1⅞ - 2-3/16	53-62
C	1½ - 1⅞	43-53
Small	under 1½	under 43

(c) *The North American system*—In the United States and Canada, weight grading is based on ounces per dozen, with three ounce ranges between grades. They are listed below, with the equivalent figures in ounces per egg and grades per egg for comparison purposes:

Ounces per dozen	Ounces per egg	Grams per egg
under 18	under 1.5	under 42.55
18 to 21	1.5 -1.75	42.55-49.65
21 to 24	1.75-2.0	49.65-56.73
24 to 27	2.0 -2.25	56.73-63.83
27 to 30	2.25-2.5	63.83-70.92
over 30	over 2.5	over 70.92

The original recommendation sent to committee members for consideration was for six weight grades, as follows:

Grade 1—36-42 grams per egg
Grade 2—43-49 grams per egg
Grade 3—50-56 grams per egg
Grade 4—57-63 grams per egg
Grade 5—64-70 grams per egg
Grade 6—71 grams per egg and up.

The views of the various committee members with respect to this recommendation have been tempered to a considerable extent by the background of the system under which each has operated and it has not been possible as yet to arrive at a reconciliation of those views.

The Committee's work on egg quality standards has not proceeded to the point where the respective views or distinct areas of difference to be reconciled are quite as clearly defined as is the case with the weight grades.

A proposal is at present being studied with respect to the

desirability of:

1. Three grades for quality;
2. The grades to be defined by candling definitions designed to interpret the appearance of opened-out eggs;
3. Aircell size to be incorporated as a grade factor, and to be measured in millimeters.
4. The definitions of undesirable eggs which should be excluded.

Two points, other than actual grade definitions, which promise to present difficulty in arriving at a majority recommendation are:

1. Whether three quality grades, as used in North America, or two grades, as used mainly in other areas, is preferable!
2. Whether storage eggs and fresh eggs should be combined in the same grades or separated for grading purposes.

While rather basically different viewpoints indicate that the task of drafting standards which can be supported by all committee members will be very difficult, the ultimate objective has such distinct merit that it would seem to be highly desirable to continue the efforts of the committee to that end. While it is hoped that the committee as now constituted will be re-endorsed by the Association for this purpose, I seriously suggest the desirability of having the chairmanship pass into the hands of someone closer to and more directly associated with European interests, where the majority of those most intimately concerned with this matter are located.

Respectfully submitted,
S. C. Barry, Chairman,
Grades Standards Committee

REPORT OF THE MEETING OF THE EGG GRADE STANDARDS COMMITTEE

(held at the Sorbonne, Paris on 8th August, 1951)

(a) The Committee places on record its gratitude for the valuable services rendered by the outgoing Chairman, Mr. S. C. Barry, (Canada).

(b) The Committee recommend the appointment of Mr. J. G. Tukker as Chairman.

(c) The Committee, in view of the fact that no definite conclusions have yet been arrived at, recommend that the Food and Agricultural Organization be informed that the Association had appointed an International Egg Standards and Grades Committee and

would be pleased to pass on its conclusions and recommendations when such had been arrived at. It was also recommended that the F.A.O. should be advised that if they had any suggestions which might be helpful to the Committee they would be glad to have them and be pleased to co-operate.

The Report was approved.

Members of Grade Standards Committee
World's Poultry Science Association

Herr Tor Anda, Rogaland Egglag, Sandnes, Norway.
Mr. S. C. Barry, Department of Agriculture, Ottawa, Canada.
Mr. A. J. Benning, Division of Economics and Markets, Department of Agriculture, Capetown, South Africa.
Herr Einar Haeggblom, Slakmore, Karemo, Sweden.
Mr. H. G. F. Hamann, Dairy and Poultry Inspection Division, Production and Marketing Administration, Department of Agriculture, Washington 25, U.S.A.
Dr. A. J. Hennerty, Department of Agriculture, Upper Merrion Street, Dublin, Eire.
Mr. Nurul Islam, 49, Intelligence School, Queen's Road, Karachi, Pakistan.
Herr Lohse, Statskontrollen Med Mejeriprodukter og Aeg, Kristiansgade 22, Copenhagen, Denmark.
Mr. A. Luchinger, Dornacherstrasse 36, Basel, Switzerland.
Mr. M. R. K. Cowdrey, Supervisor of Egg Section, Marketing Dept. P.O. Box 1500, Wellington, New Zealand.
Mr. J. C. Parkinson, Eggs Division, Ministry of Food, 1 Ulster Terrace, Regents Park, London, N.W. 1, England.
Sr. D. J. G. Piedrafita, Carcastillo, Navarre, Spain.
Mr. R. F. Thompson, Ministry of Agriculture, Stormont, Belfast, Northern Ireland.
Mr. J. G. Tukker, De Inspecteur van de Landbouw, Utrechtseweg 298, De Bilt, Holland.
Prof. Dr. Anita Vecchi, Professor of Zooculture, University of Bologna, Via San Giacomo 9, Bologna, Italy.
Mr. W. L. Whitshall, Department of Commerce and Agriculture, Reliance House, 301, Flanders Lane, Melbourne, Australia.
Prof. A. E. R. Willems, Laboratoire de Zootechnie, Casinoplein 11, Gand, Belgium.
M. Alex Wiltzer, 34, rue de Lille, Paris VIIe, France.
Secretary—
Mr. M. W. Buster, Poultry Branch, Production and Marketing Administration, Dept. of Agr., Washington 25, U.S.A.

Reception of the leading official delegates of the countries participating in the Ninth World's Poultry Congress, Paris, France on August 7, 1951 at the Elysee by Monsieur Vincent Auriol, the President of the French Republic. (Front row, fifth from right.)

REPORT OF THE TRIENNIAL MEETING OF THE WORLD'S POULTRY SCIENCE ASSOCIATION

The Triennial meeting of the World's Poultry Science Association was held in Paris on the 9th of August on the occasion of the 9th World's Poultry Congress when there was an attendance of over 150 from 23 countries.

The Secretary submitted the Report of the Council Meeting held on August 4 at which there was an attendance of 33 members representing 13 countries.

Dr. Coles (England) submitted the following Report of a Committee set up by the Council to consider the Titles of the Papers Sections:

1. That the headings for the Papers Sections at the next Congress should be
   - (a) Genetics and Breeding
   - (b) Physiology and Nutrition
   - (c) Diseases and their Control
   - (d) Economics and Marketing
   - (e) Husbandry and Miscellaneous
2. That a recommendation be made to the Organizing Committee for the next Congress that
   - (a) the sub-titles for the Sectional Headings should be the responsibility of the Organizing Committee of the host country after consultation as to their wording with the Council of the Association.
   - (b) that arrangements should be made for the improvement of the first day's programme with a view to allowing for discussion of the main papers, which need not necessarily cover all five main sections.

The Report, as submmitted, was approved.

Dr. R. G. Jaap, (U.S.A.) who occupied the Chair in the unavoidable absence of the Chairman, Professor C. S. Platt, submitted the following Report of a meeting of the *Egg Laying Test Committee* held on 7th August:

"Professor Platt's summary of "Basic Rules" as published in the World's Poultry Science Journal, Vol. 6, No. 4, October-December, 1950, was reviewed. It was agreed that the next action of the Committee should be to ascertain the exact purpose for each laying test and that a questionnaire should be prepared. It was recommended that the following questions should be incorporated in

such a questionnaire:

1. Is the test under governmental supervision or that of private enterprise?
2. What useful purpose or purposes, does your egg laying test fulfil?
3. Does it attempt to sample the entire flock of each entrant?
4. Does it attempt to demonstrate the progeny test method with only a part of the breeder's (entrant's) flock?
5. Could all egg laying tests in your country be standardized?
6. Considering the expense in proportion to the results obtainable, is an egg laying test in which all birds are reared and housed at one location desirable?
7. Would not entries from single sires and several dams be preferable to those from one dam and sire?"

The members of the Committee present agreed that laying tests for the purpose of demonstrating the practical usefulness of sire testing were most needed in their various countries, (Eire, Holland, South Africa, Switzerland, U.S.A.) and wondered whether the Committee as a whole might formulate specific procedure for such a test.

The Report, as submitted, was approved as also the following resolution:

"That testing of breeding worth is more important than commercial advertising."

Mr. J. G. Tukker (Holland) submitted the following report of a meeting of the *Grades Standards Committee* held on 8th August:

(a) "The Committee places on record its gratitude for the valuable services rendered by the outgoing Chairman, Mr. S. C. Barry, (Canada).

(b) The Committee recommend the appointment of Mr. J. G. Tukker as Chairman.

(c) The Committee, in view of the fact that no definite conclusions have yet been arrived at, recommend that the Food and Agricultural Organization be informed that the Association had appointed an International Egg Standards and Grades Committee and would be pleased to pass on its conclusions and recommendations when such had been arrived at. It was also recommended that the F.A.O. should be advised that if they had any suggestions which might

be helpful to the Committee they would be glad to have them and be pleased to co-operate."

The Report, as submitted, was approved.

The following recommendations were submitted from Section V (Education and Organization).

1. That a dictionary of technical terms used in poultry should be prepared in different languages.
2. That the Council should appoint a special Committee to deal with the matter.

It was reported by the representatives of Belgium, France, Holland, Spain and Switzerland that their Committees would be prepared to co-operate in the work.

The recommendations were approved for submission to the Council.

Mr. G. Hibbert (South Africa) proposed the following resolution which was duly seconded:

"The procedure governing the presentation of papers at future Congresses shall be as follows:

(a) Only a resume of a paper or remarks on any development since the preparation of the paper shall be given by the author or delegate authorized to present the paper.

(b) Discussion shall be allowed on all papers and a greater amount of time allowed for general discussion.

(c) In the absence of the author of a paper or co-worker, discussion of the paper be permitted under control and guidance of the Chairman of the respective section.

(d) Only a resume of the principal long reports be given and a discussion permitted if necessary, by a rearrangement of the Congress Agenda.

After lengthy discussion it was agreed to refer the resolution to the Council of the Association.

The following Resolutions were then unanimously adopted and it was decided that they should be presented at the Final Plenary Session on behalf of all the Members attending the 9th World's Poultry Congress.

"The 9th World's Poultry Congress expresses its most hearty and respectful thanks to M. Vincent Auriol, the President of the French Republic, for his sincere welcome and active participation in the Congress."

"The 9th World's Poultry Congress expresses its warmest thanks to the Honorary President of the Congress, Mr. Pierre Pflimlin, Minister of Agriculture.

It is certain that the development of Agriculture in France and particularly that of the Poultry Industry owes much to the foresight of the Minister and his keen appreciation of the problems involved. He is therefore deserving of our heartiest thanks."

"The Congress expresses its very sincere thanks to the City Council of Paris for their generous hospitality shown to the Congress Members during their stay in Paris."

"The Members of Congress express their sincere appreciation to Monsieur Jean Sarrailh, Restueur de l'Universite de Paris, Sorbonne, for the opportunity of holding the meetings of the Congress in their historic and magnificent buildings and for the excellent facilities provided for these meetings."

"The Members of Congress express their appreciation and gratitude to the French National Committee for their work in arranging the programme which has brought together all sections of the World's Poultry Industry, as a result of which fruitful international collaboration has been extended and intensified. The Members desire to draw attention particularly to the work of the President of the Congress, M. Alex Wiltzer, the Secretary General M. P. Waroquiez, the Treasurer, M. M. Simon, the Assistant General Secretary, M. G. Baget and all others who rendered unstinted and efficient services in the work of organization."

"The Lady members who have attended and participated in the 9th World Poultry Congress express their warmest thanks to the French Ladies' Committee for their wonderful and warm-hearted hospitality which has helped to make their stay in Paris so pleasant and profitable."

Major Ian Macdougall, Secretary

VENTILATION AND ITS APPLICATION TO POULTRY HOUSING*

C. N. DAVIES
London School of Hygiene and Tropical Medicine
London, England

In approaching the question of poultry house ventilation it is desirable to have a clear idea of the fundamental basis from which proceeds the planning of a specified system. This is by no means definite and quantitative, although ample scientific data on the respiration of fowls are available. The reason for this paradox is that the prime purpose of ventilation is to ensure freedom from disease and this is a criterion which is very difficult to tie down to figures.

The same difficulty is met with in planning the living conditions of human beings. Advances in housing conditions, seen in new construction by local authorities, have been consistently maintained over many years. The purpose is to improve health and to mitigate the toll of disease. That this is being achieved is very obvious, yet still no one can say that just so many cubic feet are necessary, so much heat, light and air, for every inmate of a block of flats, in default of which they will be decimated by tuberculosis. The result is a compromise between aesthetic and practical considerations; the minimum standards are only a guess.

With poultry, and indeed all livestock, there are two methods of estimating ventilation requirements, once the primary functions of the house have been fulfilled, these of course being the exclusion of wind and rain.

The first consists of the calculation of the carbon dioxide (CO_2) output of the birds followed by an estimate of the quantity of fresh air needed to keep the average concentration of CO_2 in the house down to a reasonable level. This does not mean that the birds will die of CO_2 if the concentration exceeds the selected value; as a matter of fact five or ten times as much would be tolerated. It implies, rather, that this readily calculable and measurable concentration is assumed to correlate with more intangible and indefinite quantities such as odour and incidence of respiratory infections, and is used merely as an index of ventilation rate.

The second method really makes a similar assumption though it is not quite so obvious. It is based on the water

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* Presented at the meeting of the United Kingdom Branch of the World's Poultry Science Association, April 13, 1951, London.

vapour exhalation of fowls which is, again, a nice, definite, easily computed number. This time, however, instead of fixing an arbitrary level, we can be more scientific and work out the precise amount of ventilation necessary to prevent condensation on the windows, walls and ceiling of the house. The air in a house is always warmer than outside owing to the animal heat. In summer, everything is opened up to keep cool, but in winter, especially if it is desired, as is common, to maintain a certain minimum temperature, ventilation must be restricted to take advantage of the animal heat, possibly supplemented with artificial heating.

In cold weather, the inside surfaces of the walls etc., are much cooler than room air. If they are below the dewpoint temperature of the inside air condensation occurs upon them. The temperature of the inside surfaces depends on the wind strength and outside air temperature, and also upon the thermal transmittance of the fabric of the structure. If the building is well made with cavity walls, filled with insulating material, double windows, etc., the temperature of the inside of the walls will be far above the outer air value so that ventilation can be considerably restricted before condensation takes place. The house will be warm but not damp.

Condensation on windows is usually tolerated but dripping roofs and walls in cold weather are an abomination and mean sodden litter, breeding parasites, and a dangerous susceptibility of the inmates to draughts. To avoid this, a poorly constructed house, made of flimsy materials, must be freely ventilated in cold weather so that either a low air temperature must be accepted or else an adequate source of artificial heat must be installed and paid for.

Some heating methods, using paraffin or gas burning without flues, produce CO_2 and water vapour which can be allowed for if the fuel consumption is known. This, in turn, can be estimated from the thermal loss from the house, calculated from the sum of the thermal transmittances of walls, roof, windows, floor, etc., and the maximum temperature it is decided to maintain indoors in the coldest weather. Allowance is made for the heat given off by the birds.

Having thus laid down the general idea behind ventilation, let us now become practical and start, appropriately, with incubation.

In the course of the 21 days of incubation an egg loses about 5½ pints of CO_2 and a good deal of water. It absorbs oxygen. Heat is given out at an increasing rate after the

fourth day, rising to one Btu (British thermal unit) per day at ten days, then fairly steadily to 9 Btu per day at the twentieth.

The temperature of the top of the egg should be 102-103°F. with the bottom 10° to 15° cooler. A CO_2 concentration above 1% in the incubator has been shown to be unfavourable. The maximum rate of CO_2 production is about 0.021 cu. ft. per 24 hours and from this figure and the normal atmospheric content (0.04%) it is easy to calculate the amount of ventilation to keep well below the danger level, say at 0.2%.

Thus, for a room containing 20,000 eggs the maximum CO_2 production is:

$$\frac{20{,}000 \times 0.021}{24} = 17.5 \text{ cu.ft. per hour}$$

If we ventilate with Q cu.ft. per hour of fresh air, this contains 0.04Q/100 cu.ft. of CO_2. Hence the total rate of adding CO_2 is—

$$(17.5 \times 0.04Q/100) \text{ cu.ft. per hour}$$

Assuming the air exchange between the inside of the incubator and the room to be adequate, and that complete mixing takes place due to convection currents, the percentage of CO_2 will therefore be—

$$\frac{(17.5 \times 0.04Q/100)\ 100}{Q}$$

If we set this equal to 0.2% we have an equation which can be solved for Q as follows—

$$17.5 \times 0.04Q/100 = 0.2\ Q/100$$

so that

$$(0.2 - 0.04)\ Q = 1750$$

and

$$Q = 1750/0.16 = 11{,}000 \text{ cu.ft. per hour.}$$

This is the maximum ventilation rate required towards the end of the period of incubation. Notice that the volume of the room does not come into the calculation.

The relative humidity of the air must be kept at 50 - 70% and owing to the high temperature it is necessary to evaporate water inside the incubator for this purpose. At hatching, a higher humidity diminishes the amount of down dispersed inside the incubator and reduces the risk of S. Pullorum disease.

Proceeding to the rearing of chicks, we find a wide variety of opinion about the best conditions, although physiolgical data are again quite definite as is shown in the following table:

Age in weeks	CO_2 prodn. per 100 birds	Heat prodn. per active bird	Water vapour exhaled per bird	Weight per bird
2	0.7 cuft/hr.	160 Btu/day	.07 grains/min.	3.5 oz.
4	1.5	210	.13	6.8
6	2.1	260	.19	11.2
8	2.7	330	.23	16.0
10	3.2	400	.29	21.0

These figures have been rounded off from the results of various experiments and enable a sufficiently accurate estimate to be made of the measures necessary to secure any desired conditions of temperature, humidity and ventilation. The question is, what conditions?

The crucial time is during the first three weeks when the top line of the table is relevant. Some rearers run the brooder room with an air temperature of 70°F. and 90°F. maintained in the brooders for some time before hardening off the chicks. Successful results are undoubtedly achieved but difficulty with humidity is likely to occur in cold weather if too high a temperature is kept up while feathering commences.

When cold air is drawn into the brooder room and heated up its absolute humidity is, of course, unchanged. But since hot air is capable of carrying much more water vapour than cold, the relative humidity falls off on heating. It is this quantity which is a measure of drying power. As a result, the air of the brooder room is highly drying and has a deleterious effect on feathering and can lead to other troubles. As a matter of engineering there is no difficulty in putting this right. All that is required is a boiler to evaporate water at a rate which can readily be calculated so that the room air never falls below about 65% relative humidity. The device can even be automatically controlled. This remedy, however, is very expensive and the cost of the fuel necessary for the evaporation of water is a considerable item.

For example, in a well built brick brooder house carrying 8000 chicks, when the outside air was at 30°F. and 40% relative humidity, it was necessary to evaporate six gallons of water an hour to keep the inside RH at 65% when running at 70°F. This called for a fuel consumption of 10 lbs. of coal or 17 units of electricity per hour while the cold spell lasted.

However, a relaxation of the air temperature inside the brooder house eases the situation considerably, so on grounds of economy and freedom from troubles due to too low an RH it is recommended that high temperatures and coddling be avoided. As regards carbon dioxide, setting a limit of 0.2% should again ensure satisfactory ventilation.

We now come to consider mature birds. With the advent of the battery and deep litter systems, when large concentrations of birds are kept indoors, a good supply of ventilator inlets and outlets is necessary and they must be designed in relation to the temperature range over which it is desired to operate.

It can be reckoned that mature birds produce between 8 and 9 Btu/hour animal heat per pound weight. Their CO_2 production is about 0.022 cuft/hour per lb. and the water vapour 12.4 grains per hour per lb. These are round figures; actually they vary quite a lot with the environmental conditions.

The factors to be allowed for in a typical battery will now be dealt with. Firstly, in the summer, the house must be kept cool which is usually done by opening up everything to get the maximum air change, with aid sometimes, of electric fans.

Radiant heat from the sun falling on the roof can cause great discomfort in a building with, say, a bare corrugated iron roof. Insulation of the roof pays dividends in winter as well as in summer because in cold weather the major fraction of the total thermal transmittance usually takes place through the roof. Sun blazing through windows must also be guarded against; whitewash on the outside, or screens outside are satisfactory. Blinds on the interior absorb the short wave radiation from the sunbeams, become raised in temperature, and radiate long wave radiation. Now glass, which is quite transparent to short waves, is opaque to long, so that the internal blinds act as efficient converters of solar energy and heat up the inside of the building in a very undesirable way. This drawback can be avoided by using blinds made of polished sheet aluminum which reflect the sun's rays without change of wavelength so that they pass out through the glass again without heating up the interior.

In hot weather, we have no need to worry about CO_2 and moisture. The ventilation required to keep the air temperature down is so great that products of respiration will only be present in negligible amounts. Knowing the total animal heat, the construction of the building and the exposure to the sun, it is possible to get out some kind of figures for ventilation rate in hot weather, but the usual answer is as much as possible.

In cold weather we face the question—is it possible to prevent a drop in egg production and wasteful consumption

of food by keeping the house warm? There is little scientific information on these points which can be applied to winter temperatures usually encountered in this country. In some experiments under very cold conditions it was found that egg production ceased at 0°F. and dropped 25% at 10°F. Combs froze at 60°F. On the other hand, it has been claimed that consumption of food per pound of grain increased below 60°F. while above 65°F. there was an adverse effect on appetite.

Estimates have been made of the critical temperature for fowls. This is the environmental temperature below which the heat produced by normal body processes is no longer sufficient to maintain body temperature. The loss of heat from the body by radiation, convection, conduction and evaporation is roughly proportional to the difference in temperature between the body and the environment and when the latter falls below the critical temperature, food must be consumed simply to supply heat by its chemical oxidation in the body. In the absence of food, body tissues would be consumed.

For a fasting hen at rest, the critical temperature is 62°F. An active laying hen with access to food has a value of about 47°F., and for active cockerels it may be as low as 20°F.

On these grounds one would feel inclined to recommend that laying batteries should be kept above 47°F. by day and 62°F. by night. However, it is impossible to consider the matter apart from the economic context and it may well be the case that occasional lapses during cold spells would have so little effect that the installation of costly heating appliances would not pay.

In order to keep the temperature as high as possible during cold spells, without recourse to artificial heating, it is essential to insulate the fabric of the building adequately. Roofs, especially, are a source of heat loss and should be carefully designed. Large windows also transmit a lot of heat which, in a well insulated house, may be a significant fraction of the total heat transfer. Double glazing is now available in sealed metal units and should be more frequently employed.

A large amount of warm air goes out through the ventilators and this also represents a serious loss in winter. By restricting the ventilation in cold weather, even so much as to give quite a high level of CO_2 inside, the temperature can be kept from falling too low. Restriction must stop before the point at which condensation becomes a nuisance. As already mentioned, this can be calculated and used as an index of the minimum permissible ventilation.

In a good house, CO_2 may exceed 0.5% before condensation starts on the ceiling and temperatures 15°F. or 20°F. higher than the outside air can be kept up without using artificial heat. However, the maintenance of a temperature of 47°F. under all conditions would be impossible unless very special precautions were taken.

It will be appreciated that a great deal depends on skillful management of the ventilation and heating arrangements. There is no reason why thermostatic control should not be used for both as suitable apparatus is on the market. With electrical heating, which is expensive, such control is virtually essential.

Summing up, the position is that we should have as many ventilators as we care to pay for, with windows to open in hot weather, but that everything must shut down to an irreducible minimum calculated on the condensation basis. Probably the best way to proceed is to calculate for extractors and inlets on the basis of 0.1 to 0.2% CO_2 and to have stops on the shutters to keep them from going right off, or else small, non-adjustable, subsidiary ventilators for cold weather.

The maximum extraction with a cowl of a given size is obtained by placing it as high as possible. It is therefore economical to site these on the ridge of the roof. Inlets should be set low and be of such an area that the maximum air speed through each is below the draught level, say 30-50 feet per minute. Wind can be a great nuisance in some situations, but blow back from the extractors is not likely with a good design. Inlet draughts, due to wind pressure, are avoidable by employing the self-closing type of inlet which seals itself when the air velocity through it exceeds a certain value.

With poultry there is usually no reason for siting the control shutters at the outlets, providing the doors are kept shut, if it is more convenient to baffle the inlets. In pig houses it is sometimes necessary to control the outlets because there is an opening leading to an outside run, which cannot be closed up at floor level.

EGG PRODUCTION ON HOME GROWN FOODS

R. B. SHAW and E. W. NIGHTALL
School of Agriculture, University of Nottingham, Loughborough, England

In March 1950, a report was issued by the School of Agriculture on the rearing of chicks on home grown feeding stuffs.* The report described how the chicks had been reared on Group (a) Sussex Ground Oats, minerals and wheat. Group (b) Sussex Ground Oats, Bean Meal, Minerals and Wheat. Group (c) a normal ration. The resultant pullets were transferred to their laying quarters at the age of 24 weeks and for a further 52 weeks egg production and other data were recorded. As was the case in the first part of the experiment, the purpose of this work was to determine whether the general farmer with the use of home grown foods only, could make a worth while profit from his poultry.

The pullets continued in their original groups and basically the rations remained the same with regard to differences in protein content, but certain additional foods were used, such as dried grass, barley, oats and cod liver oil.

These rations are set out in detail in Table 1. The rations fed to Group C were the same as those given to the other pullets on the farm and had to be altered slightly from time to time according to market supplies. The Group C. rations shown in the table are an average of all those employed.

At the end of the rearing period several unsatisfactory birds had to be culled. Three of these came from Group A, three from Group B and one from Group C. Thus for the egg production part of the experiment there were in Group A 31 pullets, Group B 29 pullets and Group C 26 pullets. Under normal practice several more pullets from each group would probably have been culled, but it was considered best for experimental purposes to carry forward as many birds as possible to the second stage.

All the pullets were first crosses, chiefly Brown Leghorn x Rhode Island Red with a few Brown Leghorn x Light Sussex and Rhode Island Red x Light Sussex.

The three houses used were similar and of the slatted floor type, each with a capacity of 50 birds. If the winter of 1949-50 had been severe this understocking of the houses might have affected the birds adversely but the weather was

* Rearing chicks on home grown feeding stuffs. R. B. Shaw and E. W. Nightall. Worlds Poultry Science Journal, Vol. 6, No. 3: 201-206, 1950.

TABLE I—Rations

Ingredients	Group A No Protein Supplement	Group B Vegetable-Protein Supplement	Group C Protein Supplement as in normal ration
	lbs.	lbs.	lbs.
Ground oats	28	14	14
Fine wheat offals	—	—	15
Coarse wheat offals	—	—	4
Barley meal	—	—	18½
Potato flakes	—	—	18
Maize meal	—	—	13¼
Bean meal	—	14	—
Fish meal	—	—	7½
Dried grass	1½	1½	7½
St. bone flour	1¼	1¼	—
Manganesed salt	(2 oz.)	(2 oz.)	¼
Limestone flour	—	—	2
Cod liver oil	(⅛ pt.)	(⅛ pt.)	(¼ pt.)
Grain*			
Wheat	1	1	½
Barley	1	1	1
Oats	—	1	1
Maize	—	—	1½
Chemcial Analysis of one sample	%	%	%
Crude protein	10.9	17.0	15.3
Crude fiber	10.6	9.1	7.6
Moisture	12.0	12.2	11.9
Oil	4.5	3.6	4.4
Ash	7.2	7.5	7.4

* 2 oz. per bird daily.

mild and the stock remained in perfect health and completely free from colds for the duration of the trial.

The houses were placed in grass runs of equal size and moved at reasonably frequent intervals to ensure good management of the grassland. The area allowed was approximately: Group A. 50, Group B. 53, Group C. 59 square yards per bird. The pasture, sown in 1939 was not of a very high quality compared with other pens on the farm. The birds made good use of the runs, particularly in the morning and the three groups appeared to use the runs equally in contrast to earlier experiments on protein levels when the birds on a diet without any protein supplement tore up their pens rather severely. In the late spring and summer the grass was controlled both by cutting and sheep grazing.

The feeding consisted of dry mash and grain, the former being available all the time. The houses were equipped with mash hoppers that could be reached by the birds from both inside and outside the houses and the same arrangement applied to the water vessels. After frost danger was over an additional water vessel was placed in the run. The grain was fed at approximately 4 p.m. each afternoon. The hen exits were

closed at dusk and opened at 7:45 a.m. daily until June, after which, they were permanently open except for the few occasions when the birds were kept in for weighing. Cockle Shell and flint grit were provided ad lib.

The eggs were collected daily and the eggs from each group weighed in bulk. A number of eggs were laid on the floor slats during the night and a high proportion of these were broken and pushed through the slats by the birds. When the dropping boards were cleaned these broken eggs were counted and recorded. Egg production results are given in Table II.

TABLE II

Average Monthly Egg Production per pullet and Average Monthly Egg Weight

Period Number	4 week period ending	Group A		Group B		Group C	
		Av. Prod. per bird	Av. Egg wt. ozs.	Av. Prod. per bird	Av. Egg wt. ozs.	Av. Prod. per bird	Av. Egg wt. ozs.
6	Oct. 7th	(age of birds 24 weeks)			—	0.35	2.2
7	Nov. 4th	—	—	—	—	3.81	1.89
8	Dec. 2nd	2.90	1.97	2.64	1.85	9.69	1.9
9	Dec. 30th	14.26	1.98	11.82	1.99	10.35	2.06
10	Jan. 27th	18.16	2.14	14.21	2.13	11.53	2.16
11	Feb. 24th	19.73	2.20	17.18	2.14	15.48	2.26
12	Mar. 24th	22.00	2.21	17.44	2.13	19.20	2.24
13	Apr. 21st	21.63	2.19	17.52	2.12	19.12	2.24
14	May 19th	20.40	2.23	16.96	2.12	18.63	2.25
15	June 16th	19.53	2.21	17.20	2.12	18.52	2.18
16	July 14th	16.73	2.22	15.28	2.15	15.68	2.23
17	Aug. 11th	17.34	2.23	15.16	2.17	15.05	2.24
18	Sept. 8th	14.96	2.24	13.50	2.17	16.33	2.26
19	Oct. 6th	13.93	2.24	12.37	2.21	10.67	2.30
Total Av. Production			201.57		171.28		184.41
Hen Housed Average			194.29		154.52		168.23
Total egg wt. per hen in ozs.			446.96		364.64		406.21
Av. weight per egg in ozs.			2.19		2.13		2.20
†Smashed and unsaleable eggs			230		213		287

† Chiefly Dropping Board eggs not included in averages given above.

Although the production of Groups A and B does in fact cover a period of 48 weeks only, the table has to relate to a period of 56 weeks because of the earlier maturity of a few birds in Group C. It will be seen that generally there was rather slow maturity in all groups, Group A did however mature very evenly with Group B not far behind, and during the third period when the birds were between 32 and 36 weeks of age, production was quite substantial. Group C matured rather slowly. One bird in this group commenced to lay between 20 and 24 weeks but the remainder gradually came into production over the next four periods (October 7th to January 27th).

TABLE III

Monthly Average Body Weights with Losses and Gains

Period Number	Period Ending	Group A			Group B			Group C		
		Weight	Gain	Loss	Weight	Gain	Loss	Weight	Gain	Loss
		lbs. ozs.	ozs.	ozs.	lbs. ozs.	ozs.	ozs.	lbs. ozs.	ozs.	ozs.
6	Oct. 7th	3 13.03	—	—	3 14.40	—	—	4 8.50	—	—
7	Nov. 4th	4 8.90	11.87	—	4 9.10	10.70	—	5 3.80	11.30	—
8	Dec. 2nd	5 9.00	16.10	—	5 10.80	17.70	—	5 11.10	7.30	—
9	Dec. 30th	5 8.80	—	0.20	5 13.70	2.9	—	5 10.10	—	1.00
10	Jan. 27th	5 14.96	6.16	—	6 2.00	4.30	—	5 15.69	5.59	—
11	Feb. 24th	5 15.46	0.50	—	6 1.50	—	0.5	6 4.80	5.11	—
12	Mar. 24th	5 14.93	—	0.53	6 0.00	—	1.5	6 6.70	1.90	—
13	Apr. 21st	6 2.26	3.33	—	6 3.70	3.70	—	6 4.80	—	1.90
14	May 19th	6 3.60	1.34	—	6 3.85	0.15	—	6 4.00	—	0.80
15	June 16th	5 12.40	—	7.20	6 8.64	4.79	—	6 4.17	0.17	—
16	July 14th	6 4.00	7.60	—	6 6.40	—	2.24	6 0.91	—	3.26
17	Aug. 11th	6 0.55	—	3.45	6 6.40	—	—	6 5.33	4.42	—
18	Sept. 8th	6 4.00	3.45	—	6 6.00	—	0.40	6 3.43	—	1.90
19	Oct. 6th	6 5.14	1.14	—	6 4.33	—	1.67	6 2.57	—	0.86

Production in Group C was slow until the birds were 40 weeks of age. All the groups laid steadily once they had settled down to production, but Group A were always ahead with Group C and B following in that order. It will be seen that Group A put up a very good performance during the two winter months of December and January. By the end of the experiment Group A (no protein) had on a hen day basis averaged 202, Group B (bean meal) 171, and Group C (normal ration) 184 eggs. The hen housed averages were Group A 194, Group B 154, Group C 168 eggs.

The birds were unculled for the duration of the trial and birds were removed only as deaths. Unfortunately, a thief visited Group A house during July, forced the lock and removed two of the pullets. It is conceivable that if these two birds had remained the hen housed average would have been very close to 200 eggs.

Egg weight tended to show a very gradual increase throughout the trial with Group C (normal ration) very slightly the heaviest and Group B (bone meal) definitely the lightest. This result seemed to indicate that bean meal had a depressing effect on egg weight.

The figures relating to eggs smashed and unsaleable show that the birds in Group C were the clumsiest and broke more eggs than the others. This occurred both in the nests and on the

TABLE IV

Food Consumption (52 weeks)

Period Number	4 week period ending	Group A				Group B				Group C			
		Mash		Grain		Mash		Grain		Mash		Grain	
		per bird ozs.	per bird per day ozs.	per bird ozs.	per bird per day ozs.	per bird ozs.	per bird per day ozs.	per bird ozs.	per bird per day ozs.	per bird ozs.	per bird per day ozs.	per bird ozs.	bird per per day ozs.
7	Nov. 4	71.22	2.54	44.26	1.58	70.34	2.51	46.07	1.64	87.23	3.11	35.85	1.28
8	Dec. 2	83.23	2.97	49.09	1.75	94.14	3.36	61.36	2.19	76.31	2.72	73.85	2.63
9	Dec. 30	77.87	2.78	54.19	1.93	87.07	3.11	50.36	1.79	84.61	3.02	52.77	1.88
10	Jan. 27	95.55	3.41	54.19	1.93	86.07	3.07	53.14	1.90	91.38	3.26	47.08	1.68
11	Feb. 24	103.73	3.70	56.33	2.01	98.07	3.50	59.63	2.13	109.76	3.85	58.56	2.09
12	Mar. 24	102.80	3.67	50.40	1.80	113.18	4.04	61.92	2.21	96.64	3.45	47.04	1.68
13	Apr. 21	96.93	3.46	58.66	2.09	102.22	3.65	62.22	2.22	94.72	3.38	72.64	2.59
14	May 19	102.80	3.67	60.93	2.18	94.96	3.39	61.33	2.19	82.16	2.93	50.33	1.80
15	June 16	88.66	3.17	57.60	2.06	92.16	3.29	62.00	2.21	87.13	3.11	55.22	1.97
16	July 14	88.13	3.15	49.47	1.77	83.36	2.98	69.20	2.47	97.27	3.47	42.45	1.52
17	Aug. 11	81.24	2.90	57.96	2.07	92.96	3.32	57.12	2.04	98.28	3.51	63.62	2.27
18	Sept. 8	100.27	3.58	58.00	2.07	86.66	3.09	55.17	1.97	79.43	2.84	56.57	2.02
19	Oct. 6	84.85	3.03	61.28	2.18	99.00	3.53	63.50	2.26	88.38	3.15	57.52	2.05
Total consumption per bird (ozs.)		1177.28		712.36		1200.19		763.02		1173.30		713.50	
Total grain and mash per bird (52 wks) (lbs.)		118.10				122.70				117.92			

slats and had a considerable effect on the cleanliness of the eggs in the group.

Body weight (Table III) increased very rapidly during periods 7 and 8 although this was less pronounced in Group C which had attained a greater weight than the other two groups at an earlier stage. There was a decided set back when the birds produced more heavily in the ninth period, there being an actual loss in weight in Groups A and C. After the tenth period the average body weight fluctuated, sometimes gaining and sometimes losing. Although Group A and B started some ten ounces lighter than Group C they both finished slightly heavier than Group C with Group A (no protein) the heaviest of all. The recording was done at the end of every 28 days when each group was weighed in bulk. The weighing was done at the same time on each weighing day so that the food contents of the birds were approximately the same.

Table IV indicates that taking the trial period as a whole food consumption was very similar in all groups. Group C consumed the least food and Group B the most, with Group A consuming only 0.18 lbs. per bird more than Group C.

The mortality record is presented in Table V.

TABLE V
Mortality and Causes

Group A		Group B		Group C	
Deaths	1	Deaths	5	Deaths	5
Cause		*Cause*		*Cause*	
No lesions	1	Tumor Formation	1	Multiple Tumor Formation	1
		Egg Peritonitis	2	No lesions	1
Stolen 2		Heart Disease	1	Visceral Lymphomatosis	2
		Cystic Nephritis	1	Egg Peritonitis	1
Percentage Mortality	3.23%		13.79%		19.23%

CONCLUSION

This experiment (parts I and II) has demonstrated: (1) that pullets running on good grass land and fed on simple home grown foods without any added protein can be reared rather slowly but otherwise quite satisfactorily. (2) that the same pullets can lay a large number of eggs over a period of 48 weeks and in this particular instance actually produced more eggs than birds fed on a more conventional rearing and laying ration. (3) The pullets given a ration containing a high quantity of bean meal was the least satisfactory.

FOWL'S PIP AND THE MARVEL OF STREPTOMYCIN

JOAQUIN PULGAR
Instituto Agricola San Cristobal, P.T., Republicana Dominicana

The simple coryza of fowl, commonly called pip, has finally been conquered by science after years of experimentation, searching for a remedy for this terrible malady. Pip has always constituted one of the biggest problems for fowl raisers who from year to year have seen their flocks depleted without being able to remedy the evil, until finally the marvel of *Streptomycin* was discovered. Streptomycin, without a doubt, constitutes the specific remedy for this discouraging disease.

Experimentally, I have applied 120 injections to birds with severe cases of pip. Many of these birds were in a grave state. In all cases there was complete and rapid recovery. The injections were not all applied in one day; Ten birds were used as a basis for the experiment. They all recovered following the injections. Then I applied injections to another lot of thirty birds, with the same good results, later to forty more, and finally to the last lot of forty; All the birds recovered and are in good health.

The birds were of different ages and different sexes and with all I obtained the same excellent results, using only one injection. The injections were prepared in the proportion of one gram of Dihydrate Streptomycin dissolved in 10 cc. of distilled, sterilized water. One cc. of this solution was injected into the muscle at the base of the wing of each bird. There was no necessity of segregating or special feeding of the injected birds, as is the case when using certain other medicants. The birds recovered in the second to the seventh day.

I am now observing the cured birds to see if they will remain immune to the sickness or if the sickness will reappear, and at what time this might occur, also whether the injection will have a preventive nature like a vaccination. If the latter is the case, it would really solve one of the most complicated problems of the fowl raiser.

Lately I have heard a commentary on the radio saying that aureomycin is giving the same wonderful results for this sickness; however the cost of this drug is much higher than the cost of streptomycin.

WORLD'S POULTRY SCIENCE LIBRARY

Reviewer: W. C. Thompson
Department of Poultry Husbandry,
Rutgers University, New Brunswick, N. J., U.S.A.

FOREWORD—

Due to illness during the past year this reviewer was unable to maintain his contributions to this section of the World's Poultry Science Journal. However, he hopes, beginning with this issue, to continue this branch of work and to present reviews of new books which are considered to be of immediate interest to poultry scientists everywhere. As before, he will apprciate having his attention called to new books in the poultry field, especially those which are not published in the English language.

POULTRY HUSBANDRY—1951—M. A. Jull—Third Edition—McGraw-Hill Book Company, Inc., New York City—526 pages—$6.00.

A text book, primarily for the use of students in poultry science, is of primary value if it is revised rather frequently and if it is furnished with adequate lists of references cited. Dr. Jull's "Poultry Husbandry," third edition, passes these tests with ease. It has been revised as of 1951, each chapter closes with unusually complete, 'selected literature references.' This book has been divided into fourteen logical and extremely useful chapters beginning with an elaboration of the present day situation of the poultry industry and closing with a discussion of the economics of production. As might be expected from this author some 130 pages and four chapters are given over to poultry breeding discussions. This reviewer found these parts of the text particularly illuminating and valuable. Throughout the book emphasis has been placed upon the underlying principles; such as those of breeding, incubation, rearing, housing and yarding, feeding and disease control. The literature cited over all of these divisions is extensive and comprehensive. While this book is a treasure chest for the scientific worker and the teacher in modern poultry science it is also of direct and practical interest to poultry farmers and production managers. In each instance the discussion of principles is followed closely by an equal carefully presented discussion of practices. The author has succeeded in presenting his material in clearcut, easily comprehended language. He is direct in style. It is the sort of book which will create for itself a valuable place in the history of poultry literature. Naturally, under the title chosen, the coverage of this book is general; it deals with all of the principle phases of modern poultry husbandry. The book is well illustrated throughout and has been printed in excellent type, and has been so arranged as to being easily readable. It is furnished with a good index which is always a material aid when using a reference book.

SUCCESSFUL POULTRY MANAGEMENT—1951—M. A. Jull—Second Edition—McGraw-Hill Book Company, Inc., New York City—447 pages—

The gifted and prolific author of this book has managed to prepare this second edition for publication in the same year as the above-reviewed text book. That is an accomplishment for in some ways the revision and modernization of a book is more difficult and time-consuming than the preparation of the original manuscript. Authors generally have had the benefits of criticisms and suggestions arising out of earlier editions. The times march on rapidly in those arts and sciences which collectively make up modern poultry science and husbandry. The reviser of a book must, if he is to please his reading public, be sure that every part of his presentation is carefully and correctly brought up-to-date. The author

states in his Preface that this book is primarily an "how to do it" book, written primarily for those who are actively engaged in the production, distribution and marketing of eggs and poultry meats. This reviewer has run across few books which have stuck tenaciously to the original purpose. Dr. Jull divided his subject matter into twelve important chapters, these occupying approximately 420 pages. The order follows the usual arrangement, starting with very helpful discussions of the production and management of breeding stock, the importance of culling, and the establishment of a workable flock-improvement program on every good poultry plant, and the many practical points which are concerned with renewing the flocks year by year. His attention to matters relating to the growing of young stock and the replacement of layers is excellent. It would seem in these days, that the successful poultry farm management must somehow or other build up an efficient method of replacing his flocks in each succeeding season with birds of increased potentialities, either in growth, egg production or meat production. Dr. Jull very definitely indicates the importance which is to be assigned to factors of environment. The discussion on the housing of the laying flock is particularly valuable. Also, the two chapters which he devotes to "Providing Chickens With Good Nutrition" are excellent condensations of the information which is available in this field in these days. His chapter on "Controlling Losses Due to Parasites and Diseases" is well done. His three chapters on marketing are very valuable and include the latest developments. His final chapter on "Making a Success of the Chicken Business" is a work worth reading and rereading several times by those who would go into the practical venture of egg and poultry production. Since it is the style of book which has here been indicated, the respective chapters are not followed by long lists of references cited for the benefit of those who may wish to have the lists of references used, but the author has gathered these together as Part I of the Appendix. Following his list of references he has given a "Correlated List of Visual Aids." This book may very well be studied as a companion work with Dr. Jull's "Poultry Husbandry" by all seniors and advanced students in the field of poultry husbandry. For the man on the farm "Successful Poultry Management" is a very definite contribution.

DIE FUTTERUNG DES GEFLUGELS (THE FEEDING OF POULTRY)—Revised 1950—Richard R. Römer—Published by Verlag Fritz Pfenningstorff, Stuttgart-Berlin—408 pages.

This reviewer is always particularly happy when he has the opportunity of including poultry science or husbandry books which are presented in other than the English language, for he realizes that many in the membership of the Worlds Poultry Science Association use languages other than English in their daily work. Now, through the kindness of the author, he has received a copy of this book written in the German language and published in Germany. That he has been somewhat delayed in reviewing this book is explaind by the fact that his command of the German language is somewhat slow and the process of reading so large and comprehensive a volume in German has taken much time, but it has been worth the effort. Professor Römer has prepared a text book for the student in Poultry Nutrition which is at the same time a practical dissertation on the feeding of fowls of all sorts; from baby chicks through turkeys and waterfowls to pigeons. The comprehensive character of the coverage is such that practically every keeper of fowls of any kind will find some references of interest and value. His discussions of the food nutrients and of rations and of feeding methods are all complete and show unmistakably the efforts which the author has made to examine the literature and make sure that the final recommendations are in line with present day scientific findings. The book is not heavily illustrated but the pictures which are presented are useful in character and aid in the interpretation of the text. Apparently so much material has been included in the 408 pages of this book that the publishers had to use rather fine type so that the text is a bit slow-reading. For those who are special students of poultry nutrition matters and for those businesses which deal primarily with poultry feeds and feeding, Professor Römer's book is a fine addition to the poultry science library. For those who use the German language easily it will prove a pleasure.

HATCHERY MANAGEMENT—1950—R. C. Hartman and G. S. Vickers —Published by Orange Judd Publishing Company, N. Y.—386 pages —$3.00.

The authors of this revised edition of "Hatchery Management" are eminently equipped by experience to write in this highly specialized field of poultry husbandry. Mr. Hartman has been a leader in the field of poultry journalism in America for many years and Mr. Vickers, formerly Poultry Extension Specialist in Ohio State University, is Field Manager of the Ohio Poultry Improvement Association. Both authors have had contacts for many years with that phase of the American poultry industry which deals with the commercial production of day-old chicks. This industry, grown to be a most significant feature of the American poultry industry, has followed the discovery of efficient ways and means of artificial incubation of eggs and rearing of chicks and also the discovery of the practicability of sending day-old chicks through public conveyors from the hatcheries to the farms where they are to be grown. This book, in 29 well chosen chapters, tells the story of the development of "the baby chick industry" in America in recent years. An interesting statement of the history of the chick industry is given, followed by a clear and complete discussion of the factors involved in the establishment of hatcheries and the physical equipments needed. A chapter has been given, as it should be, to the all-important item of "the egg supply." The necessity of hatcherymen being interested in flock improvement is presented. The roll of cross-bred chicks, in line-bred chicks, and of "sexed chicks" is discussed quite adequately. The chapter on hatchery sanitation is well presented, although a most difficult subject. The book also deals with advertising, merchandising, and marketing methods as applied to day-old chicks. In fact this phase of the baby chick industry is extremely well presented. A good chapter on hatchery records closes the book. The book has been excellently printed in a fine quality of paper. The illustrations are helpful as is the list of references and the index. It is the type of book that will at once be most useful to students of the modern poultry industry and also to those who depend upon the commercial production of day-old chicks either as a source of business for themselves or, as a supplement to the poultry farm which they are operating. It is a specialized book; it deals with the problems which are inherent in that segment of the modern poultry industry which the authors have seen fit to cover. It doesn't pretend to depart from that assignment.

POULTRY SCIENCE AND PRACTICE—1951—Third Edition—Winter and Funk—J. B. Lippincott Company, Philadelphia, Pa.—662 pages —$6.00.

These well known American poultry writers have just published the 1951 edition of the general text book which originally appeared in 1941. Mr. A. R. Winter is Professor of Poultry Husbandry at the Ohio State University, and Mr. E. M. Funk is Professor of Poultry Husbandry at the University of Missouri. Both are educators of many years of experience, both have spent most of their working years in the mid-west of the United States, and both have been in very close touch with American farmers and poultrymen. In 18 splendidly arranged chapters covering some 620 pages the authors have gone down through the list of phases of the American poultry industry which readers of our poultry literature have long since come to recognize as the integral parts which constitute present day poultry science. This reviewer was particularly impressed with their chapter 3 on "The Anatomy and Physiology of the Chicken." It seems to him that the trend in poultry science is toward a better understanding of the anatomy and physiology of the chicken, as a background for the more comprehensive study of breeding, disease control, feeding and nutrition, and, in fact, all phases of efficient poultry and egg production. The teacher, desiring a text book which has an extremely broad coverage, will delight in this third edition of Winter and Funk. He will find two chapters on turkeys, one on waterfowl, and miscellaneous poultry, and one on game bird production. The publishing job has been beautifully done, the print is excellent, the paper good and the method of binding most useful. The illustrations are prolific and well chosen. The book endears itself to teachers by including at the end of each chap-

ter review questions which will force a general summarization of the chapter and the coordination of its contents. The research worker as well as the teacher will find a most complete list of references given at the end of each chapter highly valuable in penetrating the background which has been studied by the authors and which is suggested as material for further elaboration of the points made. The style of writing is easy reading. This book together with the four mentioned just above furnishes proof that in the field of poultry science in these days, many reliable books are at hand for the use of those who are engaged in poultry science research, those who teach, and those who are engaged in the production of poultry and eggs throughout the world. Not everyone who is interested in all of this new literature can hope to possess copies of each book. It is suggested that whenever possible, those who are interested in having contacts with these books try to persuade local libraries to add them to their shelves. A bigger and better poultry industry will exist, if increasing numbers of those who are in it and those who make it can get in contact with up-to-date books.

THE SAGA OF THE WATERFOWL—1949—Martin Bovey (Drawings by Francis Lee Jaques)—The Wildlife Management Institute—Washington, D. C.—141 pages.

Waterfowl are too often a neglected phase of the modern poultry industry. Many of the species included in this category are still birds of the wild, each adding its bit to the beauty of the landscape in season. May the time never come when our countryside will fail to be decorated at times with the winged creatures which comprise our wild waterfowl life! The author does not claim to have presented any new ideas in his book. He has attempted, through the use of a minimum number of words and a maximum of beautiful pictures, to plead the case for the conservation and maintenance of wildlife, in particular the wild water fowls. It is a lovely book in the truest sense of the word. Its inclusion in the library of all poultry scientists should inspire many to do their share in the effort, which must not be delayed, to maintain our wild waterfowl population before more of the species in it become rare or, indeed, extinct. One cannot but be thrilled, by the appealing beauty of such pictures; for example, as the one of the Mallard hen on page 39, or again of the wild geese on wing as depicted on page 65.

RAISING GAME BIRDS IN CAPTIVITY—1949—David B. Greenberg—D. Van Nostrand Company, Inc., New York City—224 pages.

This compact, medium-sized volume fills a long felt need in the library of poultry scientists who recognize that the raising of game birds in captivity has become a part of the field of modern poultry science and husbandry. The raising of pheasants, and quails, and partridges, and Mallard ducks and the like under domesticated conditions has come to be a necessity if the stocks of these valuable forms of bird life are to be prevented from following the heath hen and the passenger pigeon into oblivion and, indeed, extinction. In many places, for instance, pheasants are reared and bred domestically for release into the wild in order that the normal wildlife population of the pheasant may be maintained. In many places governmental agencies are actively engaged in promoting the domestic production of game birds. The sum total of these efforts is providing a new phase of agriculture which holds great interest for many and promises real contributions not only to the commercial agricultural industry but to the conservation of our natural resources. Mr. Greenberg has outlined his book with skill and due regard for the natural needs of the persons who have elected to take part in the raising of game birds in captivity. Step by step he shows how this may be done with pleasure and profit. Reading of his text will inspire many bird lovers to find a way to take part in the project. The publisher has done well with paper, print and illustrations. It is really a beautiful book, as well as utilitarian. It does not over-draw the possibility of this somewhat rare agricultural enterprise. It does make clear the need for the maintenance of these wildlife populations. It does point out the increasing needs of the future and the reasons why Nature, left alone with the problem cannot, keep up with Man's inroads into her precincts.

CONSERVATION OF NATURAL RESOURCES—1950—By Guy-Harold Smith—John Wiley and Sons, Inc.—New York City—552 pages—$6.00.

People who are interested in poultry science and in the development of the poultry and egg industries in the various countries of the globe, in order to approach their problems from the most effective point of view, must recognize what an important place natural resources have in their considerations. The soil, for example, is fundamental to the successful development of crops and plants everywhere. Water is an indispensable agent in the development of all branches of agriculture. Minerals play their part. Many forms of wildlife are closely affiliated with the poultry industries. Local state and national planning for the conservation of all natural resources have come to be recognized as essential to the building and maintenance of agricultural practice. Mr. Smith in editing this superb book on the conservation of natural resources has brought together all of these phases of the subject into a most readable, understandable and useful volume. The authors who are responsible for the various chapters are gathered from the best authorities in their respective fields. It is pleasurable reading. The publishers have done an unusually attractive job in presenting the volume. The paper is excellent. The printing and setup easy to read and to use. The illustrations, carefully chosen, and of definite service to the manuscript, and the listing of "general works on conservation" definitely helpful; many of the great names of the past in the field of conservation are listed there. This reviewer, who received his University degree nearly forty years ago from the hand of President Charles Richard VanHise of the University of Wisconsin, thrilled to find two of his notable essays on the conservation of our natural resources included in the list. This volume is an inspiration to those who believe that future generations must not be deprived of the great natural resources which were originally a part of the inheritance of the nations. The present generation must conserve and indeed rebuild if future generations are to enjoy what should be their natural inheritance. In very many ways many poultry scientists go to this edition for background material and find there countless suggestions for the way in which their future work may be best shaped. It is a beautiful volume worthy of a place in any poultry science library.

WANTED

WORLD'S POULTRY CONGRESS PROCEEDINGS

Inquiries concerning the proceedings of the following previous World's Poultry Congresses have been recently received: Holland (1921), Spain (1924), Italy (1933), Germany (1936), United States (1939). If any person has any of these Proceedings and would care to dispose of them please notify Dr. G. F. Heuser, Rice Hall, Ithaca, N. Y., U.S.A.

REVIEW OF POULTRY PUBLICATIONS

Compiled by J. W. Kinghorne,
1365 Iris St., N.W.
Washington 12, D. C., U.S.A.

GENETICS

BELL, A. E., C. H. MOORE, and D. C. WARREN. *(Purdue U., Lafayette, Ind.)* SYSTEMS OF BREEDING DESIGNED TO GIVE MAXIMUM HETEROSIS IN CHICKENS. *Poultry Sci. 29:* 749. 1950.—*An Abstract.* (Biological Abstracts)

BOHREN, B. B., J. R. SMYTH and A. E. BELL. POULTRYMEN STUDY LETHAL, SEMI-LETHAL FACTORS. Progress of Agricultural Research in Indiana, *63rd Annual Report for year ending June 30, 1950,* p. 115.—A semi-lethal, sex-linked recessive gene producing a nervous condition called "jittery" has previously been reported from this laboratory. This gene is being tested for its linkage relationship to other sex-linked genes.

Two "jittery' 'females were mated to a Black Australorp male. The barred off-spring of this cross were all males, theoretically heterozygous for barring, rapid feathering and "jittery." These males were mated to Black Australorp females. Now the female off-spring are being studied to determine the linkage relationships. (Experiment Station Record)

COLE, R. K., and F. B. HUTT. *(Cornell U., Ithaca, N. Y.)* EVIDENCE THAT EGGS DO NOT TRANSMIT LEUCOSIS. *Poultry Sci. 29:* 753-754. 1950.—*An abstract.* (Biological Abstracts)

COLEMAN, THEO. H. *(Ohio State U., Columbus.)* A COMPARATIVE STUDY OF CROSSBREDS VERSUS PUREBREDS. *Poultry Sci. 29:* 754. 1950.—*An abstract.* (Biological Abstracts)

COLLINS, W. M., C. I. BLISS, and H. M. SCOTT. *(U. Connecticut, Storrs.)* GENETIC SELECTION FOR BREAST WIDTH IN A STRAIN OF RHODE ISLAND REDS. *Poultry Sci. 29:* 881-887. 1950.—Phenotypic selection for broad breasted sires and dams in a previously unselected population of RIR's produced a significantly greater number of broad-breasted progeny than when similar selection for narrow-breasted sires and dams was practiced. A device for measuring breast width angle in degrees appeared to be superior to other methods. The sire's influence on the breast width of his progeny proved to be significant, but a similar influence by the dam could not be demonstrated due to small numbers and the confounding of dam and date of hatch. It is not implied that dams exert no genetic influence on their progeny for this character. Approx. 30% of the variance in breast width was due to differences in body wt.—*J. R. Carson.* (Biological Abstracts)

DREESEN, LESTER J., HOWARD L. WIEGERS, and F. E. MUSSEHL. *(U. Nebraska, Lincoln.)* SOME COMPARISONS OF BELTSVILLE WHITE TURKEYS WITH BROAD BREASTED BRONZE TURKEYS AND THEIR RECIPROCAL CROSSES. *Poultry Sci. 29:* 756-757. 1950.—*An abstract.* (Biological Abstracts)

GLAZENER, E. W., W. L. BLOW, C. H. BOSTIAN, and R. S. DEARSTYNE. *(N. Carolina State Coll., Raleigh.)* EFFECT OF INBREEDING ON BROILER WEIGHTS AND FEATHERING IN THE FOWL. *Poultry Sci. 30:* 108-112. 1951.—Data were analyzed on 5000 pedigreed chicks hatched from 3 strains of New Hampshires and 2 strains of Barred Plymouth Rocks over a 5-yr. period. Genetic variability in body wts. at 12 weeks was not consistently reduced as the maternal degree of relationship increased. Inbreeding had no apparent declining effect on feathering, although the regression for broiler wt. was —0.1297 ± .005, the equivalent of 1.3 ounces loss for each 10% increase in inbreeding. At the level of selection practiced in this investigation, however, the avg. gain in body wt. for the period was approx. 10 ounces, the actual and theoretical values being about equal. The estimates of heritability for 12-week body wts. ranged from 51 to 79%. With a selection pressure as strong as that used in this study, inbreeding may proceed as rapidly as possible without effecting a decline in broiler wt.—*Authors.* (Biological Abstracts)

HAYS, F. A. *(U. Massachusetts, Amherst.)* FURTHER STUDIES ON ENVIRONMENTAL AND HEREDITARY FACTORS AFFECTING WINTER PAUSE INCIDENCE AND DURATION. *Poultry Sci. 30:* 101-105. 1951.—All data so far reported on White Leghorns and Rhode Island Reds indicate that winter pause incidence and winter pause duration are regulated both by environmental and hereditary factors. Season and outside temp. have a greater effect on pause duration than length of day, hours of sunshine, or inside house temp. Intensity of laying appears to be the most important factor considered and this character has an hereditary background. Season is the only environmental factor studied that does have a significant effect on incidence of winter pause. The very great variance between generation does seem to indicate that other environmental factors are in operation. Intensity of laying stands out as having a very intimate relation to pause incidence. The very low degree of heritability of winter pause incidence simply emphasizes that inheritance of a complex physio. character may be almost completely obscured by environmental factors. The rather high degree of heritability of pause duration suggests that hereditary factors play no small part in controlling winter pause as was pointed out by Hays (1923). As a breeding procedure to reduce the incidence of winter pause it is first necessary to keep controllable environmental factors as constant as possible. The selection of breeding birds from families of lowest pause incidence and highest intensity should be a constructive method.—*F. A. Hays.* (Biological Abstracts)

KOHTS, ALEXANDER E. *(Darwin Mus., Moscow.)* ANALOGICAL VARIATION IN THE PLUMAGE OF DOMESTIC FOWLS AND GROUSE. A CONTRIBUTION TO THE PROBLEM OF INTER-RELATION OF DARWINISM AND GENETICS. *Proc. Zool. Soc. London 117:* 742-747. Illus. 1948.—Among some 200 million individual birds of *Lyrurus tetrix* that have passed through Russian markets and been examined for variations in the plumage, vars. parallel to those found in the common breeds of domestic fowls have been observed. It is suggested that similar variations may exist in the *Gallus bankiva,* ancestral to domestic fowl.—*A. O. Weese.* (Biological Abstracts)

LAMM, R. *(Hort. Res. Sta., Alnarp, Sweden.)* LINKAGE CALCULATIONS FROM SEMISTERILITY DATA. *Hereditas 36:* 457-469. 1950.—For combined estimates of linkage from aggregates of different data the method of max. likelihood is well suited. By using certain modifications of the iterative scoring system the computational procedure is quite simple. In the present paper these modifications have been extended to data involving semisterility caused by reciprocal translocation. To facilitate the computations, tables of scores have been prepared. The methods are illustrated by appln. to data, obtained from Miss C. Pellew, concerning the linkage between the point of interchange of the Thibet 7 translocation of *Pisum sativum* and the genes St and R, these crossing-

over values being 25.7 ± 4.54% and 11.3 ± 2.88%.—*R. Lamm.* (Biological Abstracts)

LERNER, I. MICHAEL. *(U. California, Berkeley.)* IMPROVED EGG SIZE. *California Agric. 4:* 6. 1950.—Chickens respond rapidly to selective breeding for large egg size. Breeding and selection methods to achieve the desired egg size are discussed in simple terms.—*G. W. Bohn.* (Biological Abstracts)

LERNER, I. MICHAEL, and DOROTHY CRUDEN. *(U. California, Berkeley.)* THE HERITABILITY OF EGG WEIGHT: THE ADVANTAGES OF MASS SELECTION AND OF EARLY MEASUREMENTS. *Poultry Sci. 30:* 34-41. 1951.—The degree of heritability of egg wt. is approx. 0.6. No positive extra-genetic maternal influence seems to be involved in the inheritance of this trait. The heritability of sexual maturity is about 0.2 to 0.3. December body wt. has a heritability falling in approx. the same range but exhibits significant maternal effects. From consideration of these figures and genetic correlations between traits, it is concluded, that (a) mass selection is preferable to family selection when improvement in egg wt. is sought, (b) combined family and mass selection adds too little to efficiency of mass selection for egg wt. to be worth while, (c) November egg wt .is a more efficient criterion of selection for April egg wt. than either beginning or April egg wt., leading to almost twice the gains expected from selection on the basis of April egg wt., because of the shortened inter-generation interval made possible by its use.—*Auth. summ.* (Biological Abstracts)

LERNER, I. MICHAEL, LEWIS W. TAYLOR, and J. R. BEACH. *(U. California, Berkeley.)* EVIDENCE FOR GENETIC VARIATION IN RESISTANCE TO A RESPIRATORY INFECTION IN CHICKENS. *Poultry Sci. 29:* 862-869. 1950.—Evidence for genetic difference in specific resistance to a respiratory disease, tentatively diagnosed as atypical infectious coryza resulting from uncomplicated *Hemophilus gallinarum infection,* as shown by the ability to maintain production during an epidemic is presented. Of particular interest is the fact that the flock in which these observations were made was free of any respiratory disturbances for 17 yrs. prior to the outbreak. The demonstrated differences were thus due to chance differentiation of genotypes in non-interbreeding lines.—*Auth. summ.* (Biological Abstracts)

MARSDEN, S. J., and M. W. OLSEN. *(Agric. Res. Center, Beltsville, Md.)* FERTILITY AND HATCHABILITY OF EGGS FROM TWO VARIETIES OF TURKEYS AND THEIR RECIPROCAL CROSSES. *Poultry Sci. 29:* 548-553. 1950.—Studies which extended over a 3-yr. period and which involved the use of more than 5000 eggs were made to determine relative differences in the percentage fertility and hatchability of turkey eggs from matings of Beltsville Small Whites, Broad Breasted Bronze, and their reciprocal crosses. The avg. percentage fertility was 94.7% for eggs from the Beltsville Small White matings, 88.6% for the Broad Breasted Bronze, 83.1% for the Broad Breasted Bronze male mated to Beltsville Small Whites and 68.8 for the reciprocal cross. The avg. hatchability, based on a total of 4264 fertile eggs, was 69.1% for Beltsville Small White, 62.1% for Broad Breasted Bronze male x Beltsville Small White female, 44.2% for Beltsville Small White male x Broad Breasted Bronze female, and 43.9% for Broad Breasted Bronze matings. The authors conclude that there is a factor, or factors present in the egg which account in part for difference in hatchability, and that such characteristics are not altered in the current generation by the male with which a hen is mated. Since the female plays such a major role in determining hatchability, it is suggested that selection based on the hatching record of the dam should be an effective method of improving hatchability.—*M. W. Olsen.* (Biological Abstracts)

MOORE, C. H., A. E. BELL, and D. C. WARREN. *(Purdue U., Lafayette, Ind.)* A STUDY OF PREDICTABILITY OF COMBINING VALUES OF INBRED LINES. *Poultry Sci. 29:* 772. 1950.—*An abstract.* (Biological Abstracts)

MUELLER, CLYDE D. *(Kansas State Coll., Manhattan.)* A COMPARISON OF COMMERCIAL INBRED-HYBRIDS AND FIRST GENERATION CROSSBREDS. *Poultry Sci. 29:* 773. 1950.—*An abstract.* (Biological Abstracts)

SCOTT, H. M., C. C. MORRILL, J. O. ALBERTS, and ELMER ROBERTS. *(Illinois Agric. Expt. Sta., Urbana.)* THE "SHAKER" FOWL, A SEX-LINKED SEMI-LETHAL NERVOUS DISORDER. *Jour. Heredity 41:* 255-257. Illus. 1950.—A nervous disorder, which appears between the 3d and 4th week of life, was noted in Rhode Island Red chicks. Test matings indicated that the mutation behaved as a sex-linked recessive. Relatively few "Shaker" chicks were able to walk without stumbling after reaching the age of 10 weeks, so violent had become the shaking movements. A few afflicted individuals were reared to maturity but the majority died from inanition by the 14th week. One lesion which was consistently present in the affected birds was a significant loss of cerebellar Purkinje cells with degeneration of many of those remaining.—*H. M. Scott.* (Biological Abstracts)

STEPHENSON, A. B., and A. W. NORDSKOG. *(Iowa State Coll., Ames.)* INFLUENCE OF INBREEDING ON EGG PRODUCTION IN THE DOMESTIC FOWL. *Poultry Sci. 29:* 781. 1950.—*An abstract.* (Biological Abstracts)

VAN DRIMMELEN, G. C. ARTIFICIAL BREEDING OF POULTRY. *Jour. S. African Vet. Med. Assoc. 18:* 39-44. 1947. (Biological Abstracts)

PHYSIOLOGY

ADAMS, J. L., W. H. McGIBBON, and L. E. CASIDA. *(U. Wisconsin, Madison.)* EGGS AND CHICKS FROM ESTROGEN-FED PULLETS. *Poultry Sci. 29:* 746. 1950.—*An abstract.* (Biological Abstracts)

BERG, LAWRENCE R., and GORDON E. BEARSE. *(Washington Expt. Sta., Puyallup).* EFFECT OF IODINATED CASEIN AND THIOURACIL ON THE PERFORMANCE OF LAYING BIRDS. *Poultry Sci. 30:* 21-28. 1951.—Four feeding trials of 10 weeks duration, using iodinated casein at the rate of 15 g./100 lbs. of feed and thiouracil at the rate of 0.1% of the diet, were conducted. Both supplements caused a significant decrease in rate of lay. Iodinated casein caused a loss, and thiouracil a gain, in body wt. Both materials caused a marked decrease in feed consumption and body wt. in the 1st week after feeding started. Iodinated casein improved shell quality of birds which normally produce thin shells but had no effect on smoothness of shell, egg wt., or albumen quality. Thiouracil had no effect on shell thickness or smoothness, or on albumen index, but did cause a decrease in egg wt.—*L. R. Berg.* (Biological Abstracts)

BRANT, A. W., E. H. McNALLY, and KARL NORRIS. *(United States Dept. Agric., Beltsville, Md.)* EGGSHELL COLOR AND ITS RELATION TO CLUTCH POSITION IN RHODE ISLAND REDS. *Poultry Sci. 29:* 749. 1950.—*An abstract.* (Biological Abstracts)

COMSTOCK, R. E., E. W. GLAZENER, R. S. DEARSTYNE, and C. H. BOSTIAN. *(North Carolina Agric. Expt. Sta., Raleigh.)* EGG PRODUCTION AND HATCHABILITY IN THE FIRST AND SECOND YEARS IN TURKEYS. *Poultry Sci. 29:* 508-512. 1950.—The effects of age on egg production, intensity, and hatchability in turkey hens with respect to the 1st and 2d laying yrs. were estimated. Second-yr. birds seemed to lay at the same rate as 1st-yr. birds, but they had more pauses and more broodiness. The results suggested that retention for a 2d yr. of even carefully selected birds will at best not increase avg. flock

production and that if a very large proportion is saved without attention to hatchability the result will be less poults produced per hen. Regressions of 2d on 1st yr. performance indicated greater repeatability of hatchability than of egg production or intensity.—*E. W. Glazener.* (Biological Abstracts)

DAVIDSON, J. N., I. LESLIE, R. M. S. SMELLIE, and R. Y. THOMSON. CHEMICAL CHANGES IN THE DEVELOPING CHICK EMBRYO RELATED TO THE DEOXYRIBONUCLEIC ACID CONTENT OF THE NUCLEUS. *Biochem Jour. 46:* xl. May 1950. (Experiment Station Record)

DETWILER, R. W., F. N. ANDREWS, and B. B. BOHREN. *(Purdue U., Lafayette, Ind.)* THE INFLUENCE OF THIOURACIL AND STILBESTROL ON BROILER QUALITY. *Poultry Sci. 29:* 513-519. 1950.—The admn. of thiouracil at a level of 0.15% of the ration in combination with either 6 or 12 mg. of stilbestrol produced gains equal or superior to the controls in White Rock or Barred Rock broilers. Higher levels of thiouracil depressed growth. In general, stilbestrol-treated birds gained more rapidly than the controls. Gross feed efficiency was not significantly improved by any exptl. treatment. When caloric intake of feed was compared to the caloric composition of the edible carcass, caloric efficiency was increased 20, 30 and 50% by stilbestrol, thiouracil or the thiouracil-stilbestrol combination, respectively. Thiouracil or stilbestrol alone consistently improved carcass quality, but the combination of these 2 substances was superior to either admd. separately. Fat deposition and dressing % were increased by all exptl. treatments and protein and moisture were decreased. Comb area and testis wt. were reduced by all treatments. Stilbestrol alone or in combination with thiouracil produced max. testis inhibition. Thyroid wt. was not affected by stilbestrol alone but was increased by thiouracil; max. thyroid size was produced by the combination treatment. In these expts. it appears that max. gain, efficiency of feed utilization and market quality are obtained when a 6 mg. pellet of stilbestrol is admd. in combination with 0.15% thiouracil in the ration from the 9th to 12th weeks of age inclusively in White or Barred Rock broilers. Further reductions in period of treatment and dosage levels may be feasible.—*B. B. Bohren.* (Biological Abstracts)

DOHAN, F. C., E. M. RICHARDSON, R. C. STRIBLEY, and P. GYORGY. THE ESTROGENIC EFFECTS OF EXTRACTS OF SPRING RYE GRASS AND CLOVER. *Jour. Am. Vet. Med. Assn. 118:* 323, May 1951.—Estrogenic activity has been found in spring rye grass and spring clover. Little or no activity was found in extracts of fall rye, spring alfalfa, blue grass, spring wheat, and orchard grass. The possibility of this being important in animal husbandry in this country is considered. (Experiment Station Record)

FRAPS, R. M., and M. W. OLSEN. *(Bur. Animal Indust., U. S. Dept. Agric., Beltsville, Md.)* SURVIVAL OF DAY-OLD CHICKS UNDER CONDITIONS OF SIMULATED HIGH-ALTITUDE TRANSPORT. *Poul. Sci. 29:* 829-832. 1950.—Day-old chicks were placed in a vacuum desiccator at reduced pressures. The rate at which air was admitted into and withdrawn from the desiccator detd. the rate and extent of decompression and rate of return to prevailing atmospheric pressure. Day-old chicks at 90-92°F. withstood reduced atmospheric pressures corresponding to altitudes of 20,000 ft. for 16-20 hrs. For shorter periods, at least, simulated rates of ascent and descent up to 5000 ft./min. are tolerated. Altitude equivalents of 25,000 ft. cause death of some chicks at 90-92°F., but no losses occurred in a single test run at 73°-75°F. No untoward effects of treatment were observed in chicks carried under normal maintenance conditions for 4-14 days subsequent to tests.—*M. W. Olsen.* (Biological Abstracts)

GERICKE, A. M. *(U. Pretoria, S. Africa.)* INCOMPLETE POSTERIOR TWINNING IN A WHITE LEGHORN HEN. *Poultry Sci. 29:* 351-355. Illus. 1950.—A sexually mature white leghorn pullet is described

which is said to be an example of incomplete posterior twinning. The external abnormality was a 3d leg which was carried horizontally below the anus. Post mortem examination revealed an extra caecum, a secondary oviduct, a rudimentary intestine, an extra single set of kidneys and a secondary anus.—*D. C. Hill.* (Biological Abstracts)

GODFREY, EDWARD F., and R. GEORGE JAAP. *(Ohio State U., Columbus.)* WILL COMBINED ESTROGEN AND ANDROGEN TREATMENT STUNT BONE GROWTH IN TURKEY? *Poultry Sci. 29:* 759. 1950.—*An abstract.* (Biological Abstracts)

GODFREY, GEORGE F., and C. WILLIAMS. *(Oklahoma A. and M. Coll., Stillwater.)* RELATIVE YOLK-SAC WEIGHT IN THE DAY-OLD CHICK AS RELATED TO EARLY POST-NATAL GROWTH. *Poultry Sci. 29:* 759-760. 1950.—*An abstract.* (Biological Abstracts)

GONZAGA, ARCADIO C. *(University of the Philippines, College of Veterinary Medicine, Quezon City.)* SOME OBSERVATIONS ON ARTIFICIAL INSEMINATION OF GAME BIRDS. *Philippine Journal of Animal Industry, 10:* 357-363. Plates 1-3. 1950.—This paper reports the results of some observations on the use of artificial insemination in the raising of fighting birds. Among the results reported were: (1) Artificial insemination makes possible the production of eggs with higher fertility rate than those produced from natural mating. (2) The fighting qualities and performance of the birds, as other characteristics, were not in any way adversely affected by artificial insemination. (3) Test-tube chickens are essentially no different from those produced from natural mating. The author concluded that artificial insemination is very practicable, and will prove invaluable, in the raising of fighting birds. —*F. M. Fronda.*

GUHL, A. M. *(Kansas State Coll., Manhattan.)* MEASURABLE DIFFERENCES IN THE SEXUALITY OF COCKS. *Poultry Sci. 29:* 760-761. 1950.—*An abstract.* (Biological Abstracts)

HAYS, F. A. *(U. Massachusetts, Amherst.)* FERTILITY AND HATCHABILITY IN RHODE ISLAND REDS. *Poultry Sci. 30:* 153. 1951.—In a 5-yr. period 848 Rhode Island Red females were tested for fertility and hatchability. The simple correlation between fertility and hatchability was $+ 0.2019 \pm 0.0222$ and was significant. It is believed that this association is fictitious because fertility declined through the breeding season while embryonic mortality increased.—*F. A. Hays.* (Biological Abstracts)

HAYS, F. A., and E. W. SPEAR. *(Massachusetts Agric. Expt. Sta., Amherst.)* LOSSES IN EGG WEIGHT DURING INCUBATION ASSOCIATED WITH HATCHABILITY. *Poultry Sci. 30:* 106-107. 1951.—Records on 6 weekly hatches made on 135 Rhode Island Red females indicates an important association between shell texture and hatchability. When shell texture is measured by loss in wt. in eggs incubated for 17 days, this wt. loss should not exceed 12% if hatchability is to be satisfactory.—*F. A. Hays.* (Biological Abstracts)

HAYS, F. A. *(U. Massachusetts, Amherst.)* SEX RATIO IN CHICKS AT EIGHT WEEKS AND VIABILITY. *Poultry Sci. 30:* 98-99. 1951.—A total of 343 families of Rhode Island Red chicks were examined over a 10-yr. period to discover possible relations between the sex ratio at 8 weeks and subsequent viability. The data showed that superior viability in either sex at 8 weeks did not persist to sexual maturity in either males or females or in females during their first laying yr.—*F. A. Hays.* (Biological Abstracts)

HERRICK, E. H. ENDOCRINE GLANDS IN FOWLS. *Kansas' 15th Biennial Report of the Director, for the Biennium July 1, 1948 to June 30, 1950.* p. 74.—Male sex hormone caused a rise in the red blood cell count of female fowls and capons. Estrogenic hormone caused a drop in

the red blood cell count in male fowls due to depression of pituitary gland activity, with a resulting drop in the natural source of male sex hormone from the testes. Male sex hormone caused a distinct but not a marked rise in the white blood cell count of female fowls and capons. (Experiment Station Record)

HUNT, E. L. DEVELOPMENTAL ABNORMALITIES IN CHICK EMBRYOS TREATED WITH SUGAR. *Science 113:* 386, April 6, 1951. —In the sucrose treated series 195 eggs had living embryos when opened. Of these 44.5% ± 3.6% showed definite morphological abnormalities, compared with 8.3% ± 1.8% of 234 living embryos in the saline-treated series.

According to Needham (11), the chick embryo during the stages under discussion is largely dependent on a carbohydrate metabolism as a source of energy for growth and differentiation. Landauer (12) believes that the various abnormalities produced in his work result from interference with this metabolism. It would seem possible that sucrose reacts with the embryonic system in some such fashion, disturbing the basic developmental patterns, and being remarkably non-specific in its effects. (Expriment Station Record)

JASPER A. WILLIAM. *(U. Vermont, Burlington.)* STORAGE STUDIES OF DILUTED COCK SEMEN FOR USE IN ARTIFICIAL INSEMINATION OF CHICKENS. *Poultry Sci. 29:* 812-817. 1950.—Avian (chicken) semen was stored at 4.4°C. after dilution with varying media. Avian and human serum gave the best results as diluters when used 7 parts diluter to 1 part semen. More than 50% motility could be observed after 9 days storage. Limited fertility tests were conducted with semen stored in avian and human serum. No fertile eggs were obtained after 5 days storage, but 1 fertile egg was obtained after 20 hrs. storage in human serum. Use of *N* saline soln. and bovine serum for diluters yielded unsatisfactory results. All trials are described in detail. —*A. W. Jasper.* (Biological Abstracts)

LUCAS, ALFRED M. *(U. S. Region .Poultry Res. Lab., E. Lansing, Mich.)* LYMPHOID TISSUE AND ITS RELATION TO SO-CALLED NORMAL LYMPHOID FOCI AND TO LYMPHOMATOSIS. VI. A STUDY OF LYMPHOID AREAS IN THE PANCREAS OF DOVES AND PIGEONS. *Poultry Sci. 30:* 116-124. 1951.—Number of lymphoid areas found in cross-section of pancreas in doves and in pigeons was compared statistically with the no. counted in other avian spp. The counts made on pigeons were not significantly different from those for White Pekin ducks, pheasants and wild mallard ducks. The doves ranked between Laboratory chickens relatively resistant to lymphomatosis and farm turkeys. The reason for this wide difference in amt. of lymphoid tissue between doves and pigeons which are closely related spp. is not known. Grossly visible lymphoid tumors have not been reported for either sp. There is more evidence of tissue defense reaction against the destructive invasion of ectopic lymphoid areas in doves than in chickens or turkeys; in section they appear as restraining connective tissue boundaries. Some pigeons and doves showed visceral lesions, mostly tuberculosis but in the pancreas no significant increase in lymphoid reaction accompanied the lesions. A tabulation of the association between lymphoid areas and formed structures revealed that the association with arteries was a random one; with veins and lymph vessels it was less than would be expected from a randomized distr. No lymphoid areas invaded pancreatic islets although a 25.6% association could be expected. Lymphoid areas showed a 74.3% association with pancreatic ducts against 19.5% expected. The reason for this high affinity for pancreatic ducts is not known. A discussion of lymphoid reactions in relation to lymphomatosis is given.—*A. M. Lucas.* (Biological Abstracts)

McCARTNEY, MORLEY G. *(Pennsylvania State Coll., State College, Pa.)* THE PHYSIOLOGY OF REPRODUCTION IN TURKEYS. I. EFFECT OF METHODS OF MATING ON FERTILITY AND HATCHABILITY. *Poultry Sci. 29:* 770. 1950.—*An abstract.* (Biological Abstracts)

McCARTNEY, MORLEY G. *(Pennsylvania State Coll., State College, Pa.)* THE PHYSIOLOGY OF REPRODUCTION IN TURKEYS. II. THE DEGREE AND DURATION OF FERTILITY IN BROODY AND NON-BROODY PULLETS. *Poultry Sci. 29:* 770-771. 1950.—An *abstract.* (Biological Abstracts)

MARLOW, H. W. *(U. Texas, Dallas.)* PITUITARY-COMB RELATIONSHIP. *Endocrinology 47:* 300-302. 1950.—Saline extracts of frozen chick pituitaries injd. into capons gave significant increases in growth in both length and height of their combs. Saline extracts of fresh bovine pituitaries, in very large doses, had no effect on comb growth. Purified ACTH does not cause a change in comb size when injd. into capons. It is indicated that there is a substance(s) in chick pituitary that causes increased comb growth in capons which appears to be species specific. —*H. W. Marlow.* (Biological Abstracts)

MARSHALL, M. E., and H. F. DEUTSCH. DISTRIBUTION OF EGG WHITE PROTEINS IN CHICKEN BLOOD SERUM AND EGG YOLK. *Jour. Biol. Chem. 189:* 1, March 1951.—Conalbumin was isolated from adult chicken serum. The diffusion constant and isoelectric point of this preparation differed from those of the conalbumin from egg white, but its molecular weight was of similar magnitude. Immunochemically, it appeared to be identical with its egg white counterpart. The iron-binding capacities of both proteins are the same. Conalbumin is not present in sufficient amounts in chicken serum to account for the total iron-binding capacity of this system. (Experiment Station Record)

MORENG, ROBERT E., and C. S. SHAFFNER. *(U. Maryland, College Park.)* LETHAL INTERNAL TEMPERATURE FOR THE CHICKEN FROM THE FERTILE EGG TO THE MATURE BIRD. *Poultry Sci. 29:* 772. 1950.—*An abstract.* (Biological Abstracts)

NEHER, B. N., M. W. OLSEN, and R. M. FRAPS. *(U. S. Dept. Agric., Beltsville, Md.)* OVULATION OF THE EXCISED OVUM OF THE HEN. *Poultry Sci. 29:* 554-557. 1950.—A method is described whereby the mature ovarian follicle of the hen, removed from the ovary some 15 min. following oviposition of a preceding egg of the same clutch, ovulates in vitro. The follicle is placed in a warm porcelain dish containing about 3 ml. of modified Ringer's soln. or of 0.9% saline, covered with a watch glass, and maintained at approx. 107°F. All follicles studied were 2d or subsequent, not initial, follicles of clutches. Follicles from 45 hens laying 2-egg clutches ovulated in vitro 60.5 min. (mean) after lay. Those from 26 hens laying 3-egg clutches or greater ovulated 41.7 min. following lay. Of 70 celiotomized hens, the mean interval between lay and ovulation was 62.6 min. for 51 birds laying 2-egg clutches. The interval for 19 hens laying clutches greater than 2 eggs in length averaged 30.4 min.—*Auth. summ.* (Biological Abstracts)

O'NEIL, J. B. *(U. Saskatchewan, Saskatoon, Sask.)* RELATIONSHIP OF CHICK SIZE TO EGG SIZE AND ITS EFFECT UPON GROWTH AND MORTALITY. *Poultry Sci. 29:* 774. 1950.—*An abstract.* (Biological Abstracts)

RAMSAY, W. N. M. *(U. Edinburgh, Scotland.)* IRON METABOLISM AND HAEMOGLOBIN FORMATION IN THE EMBRYONATED HEN EGG. THE OVERALL PRODUCTION OF HAEM PIGMENTS DURING INCUBATION. *Biochem. Jour. 46:* 168-173. 1950.—A modification of the wet-digestion titanium-technic for total iron, suitable for appln. to eggs, is described. Total iron in 115 eggs has been found to avg. 1.07 mg. per egg. A modification of the 2:2'-dipyridyl method for the detn. of non-heme iron is described. It is confirmed that almost the whole of the iron in unincubated hen eggs is non-heme iron. The increase in heme iron during the course of incubation is described. It amounted to 0.14 mg. per egg after 10 days' incubation, 0.41 mg. at 14 days and 1 mg. at 21 days. During the last 9 days of incubation a fairly constant proportion of the total iron is present as heme iron at any given stage of

development. This increases from 40% at 14 days to 72% at 21 days. Heme synthesis is discussed in relation to: (i) the total amt. of iron present, and (ii) the growth of the embryo and its membranes. Approx. hemoglobin values are calculated from the heme iron figures. It is concluded that the avg. egg on the point of hatching probably contains about 200 mg. of hemoglobin.—*Auth. summ.* (Biological Abstracts)

RANDLES, CARL A., and ELEXIS L. ROMANOFF. *(Cornell U., Ithaca, N. Y.)* SOME PHYSICAL ASPECTS OF THE AMNION AND ALLANTOIS OF THE DEVELOPING CHICK EMBRYO. *Jour. Exptl. Zool. 114:* 87-101. 1950.—Detns. of specific gravity, refractive index, and pH of amnion and allantoic fluids have been made. Normal chick embryos have been compared with embryos from experimentally unturned eggs. Normal embryos have a completely formed albumen sac by the 10th day of incubation and albumen begins to appear in the amnion fluid by the 12th day; its concn. increases rapidly until the 15th day, after which it rapidly declines. In embryos from experimentally unturned eggs the albumen sac is rarely completed and the entrance of albumen into the amnion is delayed until the 13th day; the subsequent increase in concn. is not so high as normal, and a relatively high concn. is maintained until the amnion fluid disappears (19th day). The ph of amnion fluids from both normal and experimentally unturned eggs decreases from 7.5 to 6.9 and then returns to 7.2. In normal embryos the change from 7.5 to 6.9 is abrupt on the 11th and 12th days, exptl. embryos decline more slowly to 6.9 by the 15th day. Allantoic fluids in both cases exhibit continuous increases in specific gravity and refractive index, with slight but nonetheless observable differences between normal and experimental embryos. Normal embryos have greater accumulations of precipitates. The pH of allantoic fluids decreases steadily from 8 on the 10th to 5.2 by the 19th day.—Auth. *(courtesy Wistar Bibl. Serv.).*

RHODES, WILLIAM F., and GEORGE F. GODFREY. *(Oklahoma A. and M. Coll., Stillwater.)* THE EFFECT OF WASHING EGGS ON THE CUTICLE AS MEASURED BY MOISTURE LOSS AND HATCHABILITY. *Poultry Sci. 29:* 833-836. 1950.—946 clean and artificially soiled hatching eggs were washed by one of the following methods: egg washing machine plus hot water (160°F.); basket-dipped in one of two detergent solns. (155°F.); sprayed with hot water at 140°F. for 15 sec., then sprayed with tap water for 15 sec., and allowed to drain dry; and washed in a hot (130-150°F.) 2% lye soln. None of these methods of washing clean or soiled hatching eggs removed sufficient cuticle to cause a significant reduction in 14-day incubation wt.-loss or to affect hatchability. Washing eggs in the egg washing machine with hot water removed more of the cuticle than did the other methods of washing. The notion that washing hatching eggs removes the cuticle and thereby increases evaporation loss enough to cause lowered hatchability must be discarded.—*G. F. Godfrey.* (Biological Abstracts)

RIEDEL, BERNARD B. *(U. Georgia, Athens.)* THE EFFECT OF SULFAMERAZINE UPON EGG PRODUCTION AND HATCHABILITY. *Poultry Sci. 29:* 621-622. 1950.—Sulfamerazine admd. in the feed at a 0.5% concn. seriously reduced egg production in pullets. A long period of treatment with a feed containing 0.25% of the sulfonamide did not reduce the production or hatchability of the eggs.—*Authors.* (Biological Abstracts)

SADLER, W. W., and E. G. BUSS. *(Colorado A. and M. Coll., Fort Collins.)* A BASIS FOR DETERMINING THE EFFECTS OF EXPERIMENTAL CONDITIONS IN INCUBATION STUDIES. *Poultry Sci. 29:* 778-779. 1950.—*An abstract.* (Biological Abstracts)

SPRATT, NELSON. T. *(U. Minnesota, Minneapolis.)* NUTRITIONAL REQUIREMENTS OF THE EARLY CHICK EMBRYO. II. DIFFERENTIAL NUTRIENT REQUIREMENTS FOR MORPHOGENESIS AND DIFFERENTIATION OF THE HEART AND BRAIN. *Jour. Exptl. Zool. 114:* 375-402. Illus. 1950.—Both quanitative and qualitative differences in the exogenous, carbohydrate requirements for for-

mation and further development of the heart, brain, ectodermal derivatives, etc., have been revealed by: (a) explanting embryos on a non-nutrient (buffered-Ringer) medium; (b) explanting embryos on different quantities and kinds of substrates: glucose, mannose, fructose, galactose, Na pyruvate and lactate; (c) lowering the pH of the medium below 7.3; and (d) decreasing the oxygen tension around the explant. Approx. 500 embryos were explanted and observed. Development of the central nervous system, particularly the brain, is most dependent upon the proper environmental conditions. The brain and neural tube will not develop at concns. of sugar substrate which are, however, quite adequate for formation and pulsation of the heart. Brain-formation is also most sensitive to changes in pH and oxygen tension. Thus, nutritional differences characteristic of the adult heart and brain are present during their development. As a group, morphogenetic processes (regression of the streak, formation of the "tail" notochord, headfold closing of the neural folds, flexions of the head, etc.) require less exogenous, carbohydrate nutrient than processes of differentiation (histogenesis of brain, optic vesicles, heart, formation of otocysts, somites, etc.). Evidence is presented for what may be a fundamental, energetic difference between form-building and tissue-building activities.—Auth. *(courtesy Wistar Bibl. Serv.).* (Biological Abstracts)

STEPHENSON, A. B. *(Utah State Agric. Coll., Logan.)* SUPPLEMENTAL OXYGEN FOR HIGH ALTITUDE INCUBATION. *Poultry sci. 29:* 781. 1950.—*An abstract.* (Biological Abstracts)

STOCKTON, KARP L., and V. S. ASMUNDSON. DAILY RHYTHM OF EGG PRODUCTION IN TURKEYS. *Poultry Sci. 29:* 477-479. 1950.—Records for 5955 or more eggs in each of 5 yrs. showed that the turkey hens laid about 40% of their eggs before noon. Data from various sources are quoted to illustrate what is generally recognized, that chicken hens lay more eggs in the morning than in the afternoon. Fertility and hatchability of the turkey eggs laid in 1937 and 1938 were not influenced by the time of day when the eggs were laid.—*Authors.* (Biological Abstracts)

STUDNICKA, F. K. LE PROBLEME DU DEVELOPPEMENT DES ENVELOPPES DES OEUFS D'OISEAUX. [THE DEVELOPMENT OF THE ENVELOPES OF THE OVA OF BIRDS.] *Acta Anat. [Basel] 9:* 330-365. Illus. 1950.—An extensive consideration of the data and theories pertaining to the origin and function of the various layers surrounding the bird egg. It is concluded that they are not products of passive physical processes, but that "they represent products which show their own vitality and they develop under the influence of the vitality of the whole." They are of use to the ovum and offspring, not to the mother.—*H. W. Mossman.* (Biological Abstracts)

WHEELER, ROBERT S. *(U. Georgia, Athens.)* VARIATION IN TESTICULAR MATURITY OF 12-WEEK-OLD COCKERELS OF FIVE BREEDS AND SEVEN STRAINS. *Poultry Sci. 29:* 784. 1950. —*An abstract.* (Biological Abstracts)

WILEY, WILLIAM H. *(Rhode Island Agric. Expt. Sta., Kingston.)* THE INFLUENCE OF EGG-WEIGHT ON THE PRE-HATCHING AND POST-HATCHING GROWTH RATE IN THE FOWL. I. EGG-WEIGHT-EMBRYONIC DEVELOPMENT RATIOS. *Poultry Sci. 29:* 570-574. 1950.—Egg wt. was found to have a significant effect on embryonic development only in the last 2 or 3 days of incubation. This influence was of a mechanical nature, the space limits of the shell limiting the size of the embryo. The number of cells per field of embryonic tissue was controlled by egg weight, but the degree of control diminished as incubation progressed. Cell size was negatively controlled by egg wt., more noticeably so in the earlier than in the later stages of embryonic development.—*W. H. Wiley.* (Biological Abstracts)

WILEY, WILLIAM H. *(Rhode Island Agric. Expt. Sta., Kingston.)* THE INFLUENCE OF EGG WEIGHT ON THE PRE-HATCHING

AND POST-HATCHING GROWTH RATE IN THE FOWL. II. EGG WEIGHT-CHICK WEIGHT RATIOS. *Poultry Sci. 29:* 595-604. Illus. 1950.—The effect of egg wt. on various factors influencing broiler production efficiency was studied. Egg wt. did not have a constant significant effect on rate of feathering, mortality or hatchability. Chicks hatched from small eggs were significantly smaller than those from large eggs at hatching time, but this size difference was largely overcome by the 12th week. The feed efficiency in the broilers from small eggs was less favorable than in the broilers from large eggs. Considering the listed factors from a practical standpoint, the broiler producer who can obtain chicks hatched from large eggs will have a slight economic advantage over the buyer of chicks from small eggs.—*W. H. Wiley.* (Biological Abstracts)

WILEY, WILLIAM H. *(Rhode Island Agric. Expt. Sta., Kingston.)* THE INFLUENCE OF EGG WEIGHT ON THE PRE-HATCHING AND POST-HATCHING GROWTH RATE OF THE FOWL. III. SHANK LENGTH-BODY WEIGHT RATIOS. *Poultry Sci. 29:* 605-609. 1950.—Birds hatched from small eggs had a larger shank length-body wt. ratio than birds hatched from large eggs. This larger ratio indicated a slightly less desirable body conformation in the case of the small egg birds. The ratio difference between the large egg and the small egg groups was about the same as the difference in ratios resulting from sexual dimorphism.—*W. H. Wiley.* (Biological Abstracts)

ANONYMOUS. COMO OBTER OVOS GRANDES. [HOW TO OBTAIN LARGE EGGS.] *Chacaras e Quintais 5:* 611-613. Illus. 1950.—Heredity, body size, shape, feeding and hygienic technics are the main factors responsible for the production of large eggs. Eggs of at least 56 g. should be used for incubation.—*Silvio Crespo.* (Biological Abstracts)

NUTRITION

AMBROSE, A. M., and D. J. ROBBINS. STUDIES ON THE CHRONIC ORAL TOXICITY OF COTTONSEED MEAL AND COTTONSEED PIGMENT GLANDS. *Jour. Nutr. 43:* 357, March 10, 1951.—The results of these experiments point to the conclusion that cottonseed meal free of pigment glands is devoid of any toxic principle as judged by the growth of rats and histopathological examination of visceral organs.

From the acute and subacute oral toxicological data obtained, it is concluded that the toxicity of cottonseed pigment glands and gossypol is low. Single oral doses of pigment glands of up to 3,000 mg./kg, or gossypol in doses of up to 800 mg/kg each, did not appear to produce any toxic symptoms.

Since the completion of this work a paper by Lillie and Bird ('50) on chicks has appeared in which our findings on the toxicity of cottonseed pigment glands and gossypol are confirmed. (Experiment Station Record)

ANDERSON, J. O., G. F. COMBS, and G. M. BRIGGS, *(U. Maryland, College Park.)* NIACIN-REPLACING VALUE OF L- AND DL-TRYPTOPHAN IN CHICK DIETS AS INFLUENCED BY CARBOHYDRATE SOURCE. *Jour. Nutrition 42:* 463-471. 1950.—Chicks were fed graded levels of L. or DL-tryptophan in niacin-low diets to determine whether they could convert D-tryptophan to niacin. L-tryptophan was approx. twice as active as DL-tryptophan when the diet contained glucose as the source of carbohydrate. When starch replaced the glucose, the D-tryptophan was of some value. The difference in value was probably the result of a change in the bacterial flora of the digestive tract. The value of D-tryptophan was decreased by adding sulfasuxidine to the diet. Replacing the glucose with starch decreased the growth rate,

except when niacin was added. Chicks fed niacin-adequate diets with added sulfasuxidine grew more rapidly than those fed the same diets without it.—Auth. *(courtesy Wistar Bibl. Serv.).*

ARSCOTT, G. H., and G. F. COMBS. *(U. Maryland, College Park, Md.)* EFFECTS ON GROWTH OF VARIOUS CRUDE SUPPLEMENTS ADDED TO CORN-SOYBEAN MEAL CHICK RATIONS ADEQUATE IN VITAMIN B_{12}. *Poultry Sci. 29:* 746. 1950.—*An abstract.* (Biological Abstracts)

ATKINSON, R. L., and J. R. COUCH. *(A. and M. Coll., Texas, College Station.)* VITAMIN B_{12} AND OTHER FACTORS IN THE NUTRITION OF THE BROADBREASTED BRONZE TURKEY POULT. *Poultry Sci. 29:* 746. 1950.—*An abstract.* (Biological Abstracts)

ATKINSON, R. L., and J. R. COUCH. *(Texas A. and M. Coll., College Station.)* THE EFFECT OF FEEDING AN APF CONCENTRATE AND FISH SOLUBLES ON THE GROWTH OF BROADBREASTED BRONZE TURKEYS. *Poultry Sci. 30:* 81-85. 1951.—Broadbreasted Bronze turkey poults were fed a diet of soybean oil meal and ground yellow corn, plus added vitamins and minerals for a period of 8 weeks in batteries with raised screen floors, and for the remainder of a 24-weeks' test period in pens on litter. Little evidence was accumulated to the effect that the turkey poult requires a dietary source of vitamin B_{12} when an APF supplement is used to provide this vitamin or when fish solubles are used for this purpose. There was a slight indication that the males might require an additional dietary source of vitamin B_{12}; whereas, the females apparently did not have such a requirement under the conditions of this expt. It is apparent that the feeding of an APF concentrate and the feeding of fish solubles had a very definite effect on the vitamin B_{12} content of the liver, kidney, pancreas and spleen although little effect was noted on the vitamin B_{12} content of the blood of these birds.—*J. R. Couch.* (Biological Abstracts)

BEARSE, G. E., L. R. BERG, and V. L. MILLER. *(Western Washington Experiment Sta., Puyallup.)* THE EFFECT OF ENERGY LEVEL OF STARTING AND GROWING RATIONS ON THE PERFORMANCE OF LAYING HENS. *Poultry Sci. 29:* 748. 1950.—*An abstract.* (Biological Abstracts)

BERG, LAWRENCE R., GORDON E. BEARSE, and V. L. MILLER. *(Western Washington Expt. Sta., Puyallup.)* THE EFFECT OF PERIODICALLY INCREASING THE LEVEL OF CALCIUM AND VITAMIN D IN THE LAYING RATION ON THE PERFORMANCE OF LAYING HENS. *Poultry Sci. 29:* 749. 1950.—*An abstract.* (Biological Abstracts)

BERG, LAWRENCE R., GORDON E. BEARSE, JAMES McGINNIS, and V. L. MILLER. *(Washington Expt. Sta., Puyallup.)* THE EFFECT ON THE GROWTH OF FRYERS OF ADDING AN AUREOMYCIN FERMENTATION PRODUCT TO A HIGH ENERGY FRYER RATION. *Poultry Sci. 29:* 629-631. 1950.—Addition of an aureomycin fermentation product to a high energy fryer ration, in which corn was the only grain constituent and the supplementary protein was derived from 20% soybean oil meal and 6.8% herring fish meal, resulted in birds 126 and 162 g. heavier in 11- and 12-week tests, respectively.—*L. R. Berg.* (Biological Abstracts)

BLACK, D. J. G., and J. GETTY. *(U. Reading, Eng.)* SORGHUM FOR POULTRY FEEDING. *Fertiliser, Feeding Stuffs and Farm Supplies Jour. 36:* 97-100. 1950.—An unknown var. of grain sorghum, imported from Queensland, Australia, was used in 4 feeding trials with both young chicks up to 8 weeks old, and older pullets on grass range. Results indicate that 25% ground sorghum in chick mash can safely replace 15% corn meal, 5% ground barley and 5% ground oats for birds from day-old onwards; and for adult birds on grass range, sorghum can

successfully replace half of each of the other grains in a mixture consisting of 40% corn, 40% dredge corn (oats and barley mixed) and 20% wheat.—*M. T. Vittum.* (Biological Abstracts)

BLACK, D. J. G., J. GETTY, M. E. COATES, G. F. HARRISON, and S. K. KON. *(U. Reading, Eng.)* HATCHABILITY OF EGGS AND THE PRODUCTION OF CHICKS FOR THE ASSAY OF VITAMIN B_{12}. *Biochem. Jour. 46:* viii. 1950. (Biological Abstracts)

BOLIN, D. W., E. W. KLOSTERMAN, LUCILLE BUTLER, KERMIT SCHLAMB, and REESE BRYANT. *(N. Dakota Agric. Coll., Fargo.)* EFFECT OF DELAYED METHIONINE SUPPLEMENTATION IN CHICK RATION. *Poultry Sci. 30:* 42-46. 1951.—Chicks 3 weeks old were placed on a 16 and 20% protein basal ration low in methionine for a period of 12 days. One group of chicks received the basal rations with no DL-methionine added, the second group received the basal rations plus 0.3% DL-methionine, and the 3d group received at 24-hr. intervals the basal rations and the basal rations with 0.6% DL-methionine added in rotation. The chicks were weighed daily and the feed consumption recorded. The addition of DL-methionine to the basal ration increased the growth rate and less feed was required per unit gain. Chicks failed to grow during the 24-hr. interval they did not receive methionine but grew faster than those chicks in Group II when they were fed methionine the next 24-hr. interval. Methionine must be fed simultaneously with the ration in order for the chicks to utilize other amino acids in the ration. —*Auth. summ.* (Biological Abstracts)

BOUTHILET, R. J., W. L. HUNTER, C. A. LUHMAN, D. AMBROSE, and S. LEPKOVSKY. *(U. California, Berkeley.)* THE METABOLISM OF RAW VERSUS HEATED SOYBEANS IN BIRDS WITH COLOSTOMIES. *Poultry Sci. 29:* 837-840. 1950.—From the analysis of the feces and urine of chickens fed both raw and autoclaved soybeans, the following observations were made: Soybeans contain a heat-labile diuretic; the high N and methionine values in the feces of chickens fed raw soybeans as compared to those on heated soybeans, indicate poor digestion of the protein; a methionine-rich protein fraction was detected in the feces of chickens fed raw soybeans.—*Authors.* (Biological Abstracts)

BRIGGS, G. M., E. G. HILL, and M. J. GILES. *(U. Minnesota, St Paul.)* THE PRACTICAL USE OF AN ALL-PLANT RATION FOR STARTING AND BROILER CHICKENS. *Poultry Sci. 29:* 750. 1950.—*An abstract.* (Biological Abstracts)

BUCKNER, G. DAVIS, W. M. INSKO, AMANDA HARMS HENRY, and ELIZABETH FAULL WACHS. *(U. Kentucky, Lexington.)* INFLUENCE OF VITAMIN D ON THE GROWTH OF NEW HAMPSHIRE COCKERELS, THEIR COMBS, WATTLES, GONADS, AND UROPYGEAL GLANDS. *Poultry Sci. 29:* 751. 1950.—*An abstract.* (Biological Abstracts)

BURNS, C. H., W. W. CRAVENS, P. H. PHILLIPS, and J. G. HALPIN. *(U. Wisconsin, Madison.)* SODIUM REQUIREMENTS AND INTERRELATIONSHIPS WITH POTASSIUM FOR CHICKENS. *Poultry Sci. 29:* 752. 1950.—*An abstract.* (Biological Abstracts)

CARLSON, C. W., WM. KOHLMEYER, D. G. JONES, and A. L. MOXON. *(South Dakota State Coll., Brookings.)* THE USE OF COMMERCIAL APF SUPPLEMENTS IN THE TURKEY BREEDER DIET. *Poultry Sci. 29:* 752. 1950.—*An abstract.* (Biological Abstracts)

CARRICK, C. W., D. H. MISHLER, and S. M. HAUGE. FISH SOLUBLES AS SUPPLEMENTS IN CHICK RATIONS. *Progress of Agricultural Research in Indiana, 63rd Annual Report for year ending June 30, 1950,* p. 115.—Samples of fish solubles processed from sardine.

menhaden, tuna, redfish and flounder differed little when compared. An exception was tuna which was significantly poorer.

When 60% soybean meal was included in the ration, growth was retarded. This suppression was overcome somewhat by adding condensed fish solubles. (Experiment Station Record)

CARRICK, C. W., J. J. BEGIN, and S. M. HAUGE. B CAROTENE OR VITAMIN A TOPS IN EFFICIENCY? *Progress of Agricultural Research in Indiana, 63rd Annual Report for year ending June 30, 1950,* p. 114.—Results indicated that the chick utilized vitamin A acetate more efficiently weight for weight than either crystalline carotene or carotene in alfalfa meal. This relationship held true when the basal ration was relatively high in vitamin A activity. (Experiment Station Record)

CARVER, J. S., and J. McGINNIS. *(Washington State Coll., Pullman.)* EFFECT OF VITAMIN B_{12} AND APF SUPPLEMENT ON HATCHABILITY OF CHICKEN EGGS. *Poultry Sci. 29:* 752. 1950. —*An abstract.* (Biological Abstracts)

CHU, TA KUNG. *(Kansas State Coll., Manhattan)* and F. A. KUMMEROW. *(U. Illinois, Urbana.)* THE DEPOSITION OF LINOLENIC ACID IN CHICKENS FED LINSEED OIL. *Poultry Sci. 29:* 846-851. 1950.—Eight groups of day-old chicks were kept on a ration which contained from 0% to 25% linseed oil. Four of the 25% linseed oil rations were also supplemented with either ethanolamine, additional vitamins, pyridoxine, and C pantothenate or commercial lecithin. After the birds had been kept on the ration for 8 weeks, they were killed, the combined skins, livers, and gizzards extracted with alcohol and Skellysolve F, and the extracted fats separated into acetone-soluble and -insoluble fractions. A sample of each fraction was saponified and the composition of the resulting mixed fatty acids determined via the spectrophotometric method. The results indicated that the linolenic acid in linseed oil was readily deposited in the skin tissue. The amt. deposited was not dependent on the amt. of linseed oil in the ration. The skin tissue fat became satd. with linolenic acid when 25% to 29% of this acid was deposited whether the birds had been kept on a ration which contained 6%, 12% or 25% linseed oil. The linolenic acid was concd. in the acetone-soluble or neutral fat of the skin tissue rather than in the acetone-insoluble or phospholipid fraction and was totally absent from the liver. Ethanolamine, lecithin, pyridoxine, and C pantothenate or additional supplements of the known vitamins did not seem to affect the metabolism of linolenic acid markedly, although these supplements were effective in stimulating growth and increasing food consumption.—*F. A. Kummerow.* (Biological Abstracts)

COMBS, G. F., and C. S. SHAFFNER. *(U. Maryland, College Park.)* FURTHER EVIDENCE FOR AN UNIDENTIFIED GROWTH FACTOR REQUIRED BY THE POULT. *Poultry Sci. 29:* 623-624. 1950.—Beltsville White turkey poults were reared to 5 weeks on practical rations adequate in all known required nutrients except for vit. B_{12}. The addition of vit. B_{12} resulted in only a slight growth response. However, further additions of dried brewers' yeast, crab meal and menhaden fish meal promoted significantly more rapid growth than was obtained with the ration supplemented with vit B_{12} alone. These results constitute further evidence for an unidentified growth factor required by the poult.—*G. F. Combs.* (Biological Abstracts)

COUCH, J. R., and H. L. GERMAN. *(A. and M. Coll., College Station, Texas.)* PTEROYLGLUTAMIC ACID STUDIES WITH THE MATURE FOWL. *Poultry Sci. 29:* 539-544. 1950.—The egg production of hens fed a low PGA diet (20 μg./kg. diet) did not appear to be affected although the hatchability decreased to zero at the end of the 6th week. Eggs from hens fed 220-420 μg. PGA per kg. of diet with sucrose as the source of carbohydrate hatched although the PGA carryover to the chick, as detd. by the content of the vitamin in the yolk, was decreased. When the sucrose diet was fed, 820 μg. of folic acid per kg. of diet were required for highest hatchability and to obtain egg yolks that contained

as much PGA as did those of hens that were fed a practical all-mash diet. The correlation between the percent hatchability and the PGA content of the egg yolk was not high but hatchability of the eggs did increase proportionally as the amt. of PGA in the eggs increased. Evidence is presented that PGA synthesis in the intestinal tract of the fowl is favored by diets containing starch as a carbohydrate.—*Authors.* (Biological Abstracts)

COUCH, J. R., and ORLANDO OLCESE. *(Texas Agric. Expt. Sta., College Station.)* THE VITAMIN B_{12} CONTENT OF CHICK TISSUES AS INFLUENCED BY THE DIET. *Jour. Nutrition 42:* 337-346. 1950. —The feeding of 3 APF concentrates and an inhibitory sample of dehydrated alfalfa leaf meal and the injn. of vit. B_{12} intramusc. were tested for effect on growth, feed efficiency and storage of B_{12} in the tissues. The growth of New Hampshire chicks was increased by feeding an APF concentrate or by injecting crystalline vit. B_{12}, as was also the vit. B_{12} content of the tissues. The alfalfa sample used depressed the growth of the birds and tended to decrease the vit. B_{12} content of the tissues. Such growth inhibition could not be overcome by feeding an excess of vit. B_{12} in the form of an APF concentrate. APF concentrate 4 produced an increase in growth over that obtained by injecting crystalline B_{12} and such an increase was assumed to be due to the aureomycin contained in the concentrate. The B_{12} content of the liver and kidney of birds fed APF 4 was not as high as from those injected with 1 μg. B_{12}/chick/wk.—*Auth. (courtesy Wistar Bibl. Serv.).*

COUCH, J. R., O. OLCESE, B. G. SANDERS, and J. V. HALICK. *(Texas Agric. Expt. Sta., College Station.)* VITAMIN B_{12} APF CONCENTRATES, DRIED WHEY, FISH SOLUBLES AND LIVER FRACTION "L" IN THE NUTRITION OF THE MATURE FOWL. *Jour. Nutrition 42:* 473-485. 1950.—Single-Comb White Leghorn pullets, maintained in individual cages with raised screen floors, were fed a diet low in B_{12} and supplemented with dried whey, APF concentrates, fish solubles and liver fraction "L" (Wilson). B_{12} and liver extract were injected intramusc. and B_{12} also fed orally. B_{12} was found to be required for egg production, which was further improved by feeding dried whey, liver "L" and a high level of one APF concentrate (Lederle). Eggs from hens fed the diet low in B_{12} decreased in hatchability during the first 4 wks. of the test and few hatched after this time. Addition of dried whey failed to improve hatchability appreciably. After the 12th week of the test, eggs from the hens injd. with B_{12} and from those fed APF concentrates decreased decidedly in hatchability, indicating that the hens had been depleted of a factor in addition to B_{12}. The feeding of liver fraction "L" maintained hatchability throughout the test period. This product is believed to contain an unidentified factor necessary for embryonic development.—*Auth. (courtesy Wistar Bibl. Serv.).*

COUCH, J. R., J. R. REED, JR., R. L. ATKINSON, and B. E. WELCH. DISTILLERS GRAIN SOLUBLES AND DRIED WHEY WITH AN A.P.F. CONCENTRATE IN BROILER FEEDS. *Proc. Sixth Distiller Feed Conf., March 15, 1951.* p. 41.—Distiller Solubles and dried whey possess unidentified factor(s) which stimulate the growth of chicks fed an all-vegetable protein ration.

Distillers Solubles fed with DL-methionine increased the utilization of this amino acid which resulted in a further stimulation in the growth of the birds. (Experiment Station Record)

CSONKA, FRANK A. *(U. S. Dept. Agric., Washington, D. C.)* NITROGEN, METHIONINE AND CYSTINE CONTENT OF HEN'S EGGS. THEIR DISTRIBUTION IN THE EGG WHITE AND YOLK. *Jour. Nutrition 42:* 443-451. 1950.—Eggs of pullets in their 1st-year laying period were analyzed. As pullets aged and were fed a low-protein diet, the N quantity decreased in the egg white and increased in the yolk; with pullets fed a high-protein diet the N increased in both. The cystine and methionine content of the white and yolk of the eggs generally paralleled the changes in N values. However, the cystine/methionine ratio

in the egg white decreases with the age of the pullet, regardless of the diets employed. An increased ratio in the yolk resulting from aging was found to be statistically significant only during the low-protein dietary regimen. Enzymatically digested casein in the hen's feed increases the cystine and methionine content of the egg to the same extent as does casein.—*Auth. (courtesy Wistar Bibl. Serv.).*

DIETZ, A. T. *(U. California, Los Angeles.)* PROTEIN INTAKE OF LAYING HENS. *California Agric. 4*: 10. 1950.—Hens in individual cages laid as well on a medium (17.6%) protein diet as on a high (20.1%) protein diet during a 6-month test on two ranches.—*G. W. Bohn.* (Biological Abstracts)

DINNING, J. S., C. K. KEITH, and P. L. DAY. THE INFLUENCE OF FOLIC ACID ON METHIONINE METABOLISM. *Jour. Biol. Chem. 189:* 515. April 1951.—Livers from folic acid-deficient chicks oxidized choline at a reduced rate and exhibited a reduced ability to form methionine from homocysteine or homocystine in the presence of added choline or betaine. Chick kidney choline oxidase was not significantly reduced in folic acid deficiency. Dietary supplements of betaine, methionine, or creatine did not alleviate the syndrome of folic acid deficiency in the chick. The addition of folic acid *in vitro* enhanced the rate of methionine formation by folic acid-replete chick livers but not by folic acid-deficient chick livers. (Experiment Station Record)

DRAPER, C. I., C. BIDDULPH, D. A. GREENWOOD, J. R. HARRIS, W. BINNS, and M. L. MINER. *(Utah State Agric. Coll., Logan.)* CONCENTRATION OF DDT IN TISSUES OF CHICKENS FED VARYING LEVELS OF DDT IN THE DIET. *Poultry Sci. 29:* 756. 1950.—*An abstract.* (Biological Abstracts)

FANTES, K. H., D. M. IRELAND, and N. GREEN, A. COLORIMETRIC ASSAY METHOD FOR VITAMIN B_{12}. *Biochem. Jour. 46:* xxxiv. May 1950. (Experiment Station Record)

GERMAN, H. L., and J. R. COUCH. *(Texas A. and M. Coll., College Station.)* THE EFFECT OF FEEDING VARYING LEVELS OF DEHYDRATED ALFALFA LEAF MEAL ON THE GROWTH OF CHICKS AND POULTS. *Poultry Sci. 29:* 841-845. 1950.—New Hampshire chicks and Broadbreasted Bronze poults from dams fed an adequate diet were used in these tests and were maintained in batteries with raised screen floors. The basal diet contained 35% soybean oil meal and 60% corn plus mineral and vitamin supplements (less B_{12}). The effect of 2 samples of dehydrated alfalfa leaf meal on chick growth was studied by feeding the basal diet only, by supplementing with 20 μg of B_{12} per kg. of diet, with 10% alfalfa and with alfalfa and B_{12} to 4 groups of chicks, respectively. One sample of the alfalfa depressed growth whereas the other had little effect on the growth of chicks at 10 weeks. There was a direct correlation between the depression of growth and the level of alfalfa fed when 10, 20, 30 and 50% of the inhibitor sample was included in the diet. This growth inhibition could not be overcome by feeding 3 mg. of copper per lb. of feed. Chick growth was not affected when the diet contained only 3% alfalfa. A similar growth inhibition was observed by feeding 8, 30 and 50% alfalfa to young poults although a slightly different basal diet was used.—*Authors.* (Biological Abstracts)

GILLIS, M. B. *(Cornell U., Ithaca, N.Y.)* FURTHER STUDIES ON THE ROLE OF POTASSIUM IN GROWTH AND BONE FORMATION. *Jour. Nutrition 42:* 45-57. 1950.—Chicks required 0.2% K in an otherwise adequate diet for a max. rate of growth during the first 4 wks. of life. It appears, however, that due to an interrelation in the metabolism of K and P, the requirement for K was as high as 0.24% when the P content of the diet was suboptimum. Bone calcification was also significantly influenced by the amount of K in the diet of either chicks or rats. An inadequate intake of K resulted in a decrease in bone ash and lowered the amt. of P in plasma. The amt. of K required for optimum calcification was also greater when rations were fed which were marginal or

deficient in P than when an adequate amt. of P was present in them. K was also concerned in the economy of food utilization, the max. efficiency being obtained with levels of K which were approx. optimum for growth. Contrary to results reported with certain other species, biotin appeared to have no beneficial effect on chicks receiving inadequate K.—*Auth. (courtesy Wistar Bibl. Serv.).*

GILLIS, M. B., and L. C. NORRIS. THE EFFECT OF VITAMIN B_{12} ON THE RESPONSE OF CHICKS TO BETAINE AND CHOLINE. *Jour. Nutr. 43:* 295, February 10, 1951.—Under the experimental conditions reported above the addition of betaine or choline to a practical ration based on cereals and vegetable protein resulted in a significant improvement of the ration as measured by chick growth. In several experiments with White Leghorn chicks having normal body stores of vitamin B_{12}, the growth responses due to either betaine or choline supplements were approximately equal. Chicks having subnormal reserves of vitamin B_{12}, however, utilized betaine more effectively than choline. The evidence suggests that at least one mechanism by which the chick utilizes choline is impaired by a deficiency of vitamin B_{12}, while betaine retains its effectiveness under the same conditions. (Experiment Station Record)

GOLDHABER, P., L. ZACHARIAS AND V. E. KINSEY. VITAMIN E DEFICIENCY IN CHICKS.—II. PLASMA XANTHOPHYLL LEVELS AND VITAMIN E DEFICIENCY SYMPTOMS. *Jour. Nutr. 42:* 453, November 10, 1950.—Oral supplements of crude xanthophyll prevented the appearance of deficiency symptoms in 23 of 48 chicks raised on the vitamin E-deficient basal diet. This protection is ascribed to the anti-oxidant activity of the xanthophylls.

The addition of 20% cod liver oil to the natural diet caused a marked fall in the plasma-xanthophyll level. Vitamin E deficiency symptoms occurred in these animals when the plasma-xanthophyll level had decreased to 0.1 density units, thus indicating a correlation between the destruction of xanthophyll by cod liver oil and the appearance of symptoms.

Some unknown factor (probably the unsaturated fatty acids) in cod liver oil, as well as vitamin A, contributes to the destruction of xanthophyll.

The protection of xanthophyll by tocopherol occurs only in the gastrointestinal tract. (Experiment Station Record)

GRAU, G. R. *(U. California, Berkeley.)* COTTONSEED MEAL FOR CHICKS. *California Agric. 4:* 14. Illus. 1950.—Expeller-type cottonseed meal can be fed to chicks and broilers at levels as high as 40% of the diet. Lower levels are recommended for commercial use. Such rations should not be fed to laying hens, however, because cottonseed meal lowers egg quality. The exptl. diet is tabulated and vitamin requirements in the diet are discussed.—*G. W. Bohn.* (Biological Abstracts)

GROSCHKE, A. C., and R. J. EVANS. *(Michigan State Coll., East Lansing.)* THE EFFECT OF ANTIBIOTICS, SYNTHETIC VITAMINS, VITAMIN B_{12} AND AN APF SUPPLEMENT ON CHICK GROWTH. *Poultry Sci. 29:* 616-618. 1950.—A commercial animal protein factor (APF) supplement (a *Streptomyces aureofaciens* fermentation product) promoted a greater growth response than crystalline B_{12} in depleted chicks fed an APF-deficient corn-soybean oil meal basal diet during a two-week test period (2-4 weeks of age). Vit. B_{12} with streptomycin or aureomycin, however, was equal to the APF supplement in stimulating growth. Best growth was obtained with a combination of B_{12} and synthetic vitamins (thiamine, Ca pantothenate, pyridoxine, folic acid, and biotin) with streptomycin or aureomycin. The possible mechanism of the growth effect from feeding antibiotics is discussed.—*A. C. Groschke.* (Biological Abstracts)

GLISTA, W. A., and L. D. MATTERSON. *(U. Connecticut, Storrs.)* THE DETERMINATION OF INDIGESTIBLE CARBOHYDRATES IN POULTRY FEEDS. *Poultry Sci. 29:* 759. 1950.—*An abstract.* (Biological Abstracts)

HEYWANG, BURT W. *(U. S. Dept. Agric., Glendale, Ariz.)* HIGH LEVELS OF ALFALFA MEAL IN DIETS FOR CHICKENS. *Poultry Sci. 29:* 804-811. 1950.—Diets containing 0, 5, 10, 15, 20, or 25% of dehydrated or sun-cured alfalfa meal were fed to growing and to laying chickens. The data show that alfalfa meals may vary considerably in their growth-depressing effect, and that the growth-depressing effect may not be accompanied by a decrease in diet consumption. In most instances, egg production was reduced by the higher levels of the meals, but the diet consumption and hatchability of the layers were not affected. Alfalfa meal as 5% of the diet, the level commonly used, did not significantly depress growth or egg production.—*B. W. Heywang.* (Biological Abstracts)

HEYWANG, BURT W. *(U. S. Dept. Agric., Glendale, Ariz.)*, AND H. R. BIRD. *(U. S. Dept. Agric., Beltsville, Md.)* SUPPLEMENTS FOR COTTONSEED MEAL IN DIETS FOR CHICKENS. *Poultry Sci. 29:* 486-495. 1950.—Hatchability of the eggs of White Leghorns was increased when 0.8% DL-lysine was included in their diet containing 30% cottonseed meal, and 5% dried cow manure as a source of vitamin B_{12}. It is possible, however, that the lysine functioned in detoxifying the gossypol in the cottonseed meal and not in overcoming an amino acid deficiency. The results of expts. with growing White Leghorn chickens show that cottonseed meal is deficient in vitamin B_{12} (as found in dried cow manure) and lysine.—*B. W. Heywang.* (Biological Abstracts)

HEYWANG, BURT W., H. R. BIRD, and A. M. ALTSCHUL. *(United States Dept. Agric., Glendale, Ariz., Beltsville, Md., and New Orleans, La.)* THE EFFECT OF PURE GOSSYPOL ON HATCHABILITY AND EGG WEIGHT. *Poultry Sci. 29:* 763. 1950.—*An abstract.* (Biological Abstracts)

HEYWANG, BURT W. *(U. S. Dept. Agric., Glendale, Ariz.)*, H. R. BIRD *(U. S. Dept. Agric. Beltsville, Md.)*, and A. M. ALTSCHUL. *(U. S. Dept. Agric., New Orleans, La.)* THE EFFECT OF PURE GOSSYPOL ON EGG HATCHABILITY AND WEIGHT. *Poultry Sci. 29:* 916-920. 1950.—Data were obtained with 4 groups of White Leghorns fed a diet in which pure gossypol was mixed at the 0, 0.012, 0.024, or 0.036% levels. Gossypol had an appreciable adverse effect on hatchability when it was mixed with the diet at the 0.024% level and a still greater adverse effect at the 0.036% level, but did not affect either at the 0.012% level. Hatchability and egg wt. returned to normal after gossypol feeding was stopped.—*B. W. Heywang.* (Biological Abstracts)

HILL, E. G., and G. M. BRIGGS. *(U. Minnesota, St. Paul.)* STUDIES ON AN UNIDENTIFIED GROWTH PROMOTING FACTOR IN CEREALS AND OTHER NATURAL PRODUCTS FOR CHICKS. *Poultry Sci. 29:* 763. 1950.—*An abstract.* (Biological Abstracts)

HILL, F. W., and L. M. DANSKY. *(Cornell U., Ithaca, N. Y.)* STUDIES OF THE PROTEIN REQUIREMENTS OF CHICKS AND ITS RELATION TO DIETARY ENERGY LEVEL. *Poultry Sci. 29:* 763. 1950.—*An abstract.* (Biological Abstracts)

INGRAM, G. R., W. W. CRAVENS, and C. A. ELVEHJEM. EVALUATING COTTONSEED MEAL PROTEIN FOR CHICK GROWTH BY ENZYMATIC RELEASE OF AMINO ACIDS. *Poultry Sci. 29:* 590-594. 1950.—8 samples of cottonseed meal processed by various methods and subjected to different heat treatments were hydrolyzed enzymatically and the release of certain amino acids detd. microbiologically. These values were then correlated with chick growth supported by the same samples. The data show that there is a close correlation between the growth of chicks fed the cottonseed meal samples and the liberation of certain amino acids by the in vitro technic used.—*Authors.* (Biological Abstracts)

INGRAM, G. R., W. W. CRAVENS, C. A. ELVEHJEM, and J. G. HALPIN. *(U. Wisconsin, Madison.)* THE EFFECT OF FEEDING

AMINO ACID MIXTURES TO LAYING HENS. *Poultry Sci. 29:* 764. 1950.—*An abstract.* (Biological Abstracts)

INGRAM, G. R., W. W. CRAVENS, C. A. ELVEHJEM, and J. G. HALPIN. *(U. Wisconsin, Madison.)* RELATION OF TRYPTOPHAN AND LYSINE TO EGG PRODUCTION, HATCHABILITY AND COMPOSITION OF THE PROTEIN OF HENS' EGGS. *Poultry Sci. 29:* 793-803. 1950.—Expts. using zein as a source of protein in laying rations for the study of lysine and tryptophan deficiencies indicated that this protein is unsatisfactory. Even when supplemented with the essential amino acids to the level present in the control ration, zein does not adequately support egg production. Somewhat better results were obtained by supplementing corn gluten meal with lysine and tryptophan. Hens on this ration maintained almost 50% production for a 4-week period. The omission of either of the above amino acids resulted in much lower egg production. Analysis of the eggs from hens on the tryptophan and lysine deficient rations shows that the tryptophan and lysine content of the egg is not altered. Neither was the hatchability of eggs affected by the deficient rations. Attempts to use acid hydrolyzed casein as the source of protein were unsuccessful.—*Authors.* (Biological Abstracts)

JOHNSON, ELTON L. *(Iowa State Coll., Ames.)* PROVIDING VITAMIN B_{12} AND ANIMAL PROTEIN FACTOR ACTIVITY FOR CHICK DIETS. *Poultry Sci. 29:* 765. 1950.—*An abstract.* (Biological Abstracts)

KRAMKE, E. H., and J. C. FRITZ. *(Borden Company, Elgin, Ill.)* DISTRIBUTION OF THE WHEY FACTOR. *Poultry Sci. 29:* 767. 1950. —*An abstract.* (Biological Abstracts)

KRATZER, F. H. *(U. California, Davis.)* LINSEED OIL MEAL. *California Agric. 4:* 10. 1950.—Turkey poults grow slowly and some die when fed rations containing 30% to 47% linseed oil meal. Growth and survival improve when the linseed oil meal is treated with water or supplemented with pyroxidine. Commercial old-process linseed oil meal was treated by soaking in water (1 part meal to 3 parts water) for 24 hrs. and drying at 65°C.—*G. W. Bohn.* (Biological Abstracts)

KRATZER, F. H., and D. E. WILLIAMS. *(U. California, Davis.)* THE VALUE OF GROUND CAROB IN RATIONS FOR CHICKS. *Poultry Sci. 30:* 148-150. 1951.—Rations containing from 5 to 40% of ground carob *(Ceratonia siliqua)* pod and bean were fed to growing chicks. Growth was significantly reduced at levels of 5% of the ration. At 40% of the ration the growth depression was very marked and mortality was very high. The meal was slightly improved by autoclaving or by water treatment but was not improved by dry heat treatment. The growth depressant was slightly extractable by ethanol but was not extractable by acetone.—*F. H. Kratzer.* (Biological Abstracts)

KRATZER, F. H., and D. E. WILLIAMS. RAISINS FOR TURKEYS FED AT WILL WITH NO HARMFUL EFFECTS ON GROWTH AND QUALITY. *California Agriculture 5:* 13, April 1951.—Raisins may replace 30% of the grain portion, or 16% of the entire ration for turkeys in the late growing periods without markedly affecting the gains in body weight, efficiency of gain or market grade of the birds.

Raisins contain 3% to 4% crude protein and about 80% carbohydrate. Their value in animal feeding depends on their carbohydrate content which makes them a possible substitute for cereals. (Experiment Station Record)

KRATZER, F. H., D. E. WILLIAMS and B. MARSHALL. THE TRYTOPHAN REQUIREMENT OF YOUNG TURKEY POULTS. *Jour. Nutrition 43:* 223, February 10, 1951.—The tryptophan requirement of young turkey poults for growth was found to be approximately 0.26% of the ration when the basal ration contained gelatin and casein or oxidized casein. When corn gluten feed, meat scrap and gelatin, or corn

gluten feed and gelatin were used, the requirement was approximately 0.23% and 0.19%, rspectively. D-tryptophan was approximately 30% as active as L-tryptophan in promoting growth in poults. (Experiment Station Record)

LANGFORD, L., R. DOUGLAS, and R. L. BRYANT. TURKEYS SHOW NO ADVANTAGE ON HIGH PROTEIN PELLETS. *North Dakota's Agricultural Progress Through Research, Sta. Bul. 365,* January 1951, p. 72.—At the age of 194 days, of which 134 were on protein supplement feeding, the difference in gain was not significant. The lot of turkeys on the high protein supplement consumed only about two thirds as much protein supplement as the other lot and consumed about 50% more wheat. It is possible that the higher protein pellets were less palatable to the turkeys. (Experiment Station Record)

LEE, J. G. EXPERIMENTAL LATHYRISM PRODUCED BY FEEDING SINGLETARY PEA (LATHYRUS PUSILLUS) SEED. *Jour. Nutr. 40:* 587, April 10, 1950.—The ingestion of diets containing 70% Singletary pea (Lathyrus pusillus) seed meal leads to the development of the symptoms usually associated with lathyrism.

A deficiency within the ration is not the cause. The peas contain some toxic substance.

The toxicity is not due to the presence of an enzyme or toxic inorganic material.

The feeding of alpha-tocopherol in large doses confers some protection against the paralysis. This is not due to an anti-oxidant effect within the digestive tract.

Divicine is not the material present which is responsible for the skeletal and muscular changes. (Experiment Station Record)

LILLIE, ROBERT J., M. W. OLSEN, and H. R. BIRD. *(United States Dept. Agric., Beltsville, Md.)* VARIATION IN REPRODUCTIVE RESPONSE OF HENS TO DEFICIENCY OF SEVERAL DIFFERENT NUTRIENTS. *Poultry Sci. 29:* 768-769. 1950.—*An abstract.* (Biological Abstracts)

LILLIE, ROBERT J., M. W. OLSEN, and H. R. BIRD. *(U. S. Dept. Agric., Beltsville, Md.)* VARIATION IN REPRODUCTION RESPONSE OF HENS TO DIETARY DEFICIENCY. *Poultry Sci. 30:* 92-97. 1951. —In 2 expts., Rhode Island Red Pullets were kept in openfront houses and were fed a basal diet composed largely of corn and soybean meal and deficient in vitamin B_{12}. After preliminary hatchability was obtained for a period of 8 weeks, the pullets were segregated into 3 groups on the basis of hatchability. The high hatchability group was characterized by a hatchability of 85% or better; the intermediate hatchability group, a hatchability range of 70 to 84%; and the low hatchability group, a hatchability of 69% or below. When fed diets deficient in riboflavin, Mn, or vitamin B_{12} the low hatchability group proved relatively susceptible and the high hatchability group resistant to deficiency. Therefore, the variation in reproductive response was not related specifically to a difference in vitamin B_{12} requirement but to some general physiological difference which affected utilization of riboflavin, Mn, and vitamin B_{12}. The hatchability of the eggs of low and high hatchability groups in most cases remained the same when representative birds were transferred from litter-covered floors to wire-floored battery cages and continued on their respective diets. Therefore, the difference between the birds of high and low hatchability was not due to a difference in their ability to benefit from coprophagy.—*R. J. Lillie.* (Biological Abstracts)

MARCH, B., J. BIELY, and J. TONZETICH. SUPPLEMENTATION OF WHEAT WITH AMINO ACIDS IN THE DIET OF THE CHICK. *Jour. Nutr. 42:* 565, December 11, 1950.—The addition of lysine to an all-wheat ration increased the growth rate of chicks and improved the efficiency of feed utilization.

Lysine in excess of the optimum level for the particular amino acid composition of the ration decreased both the growth rate and the effi-

ciency of feed utilization.

The addition of methionine or tryptophan to an all-wheat ration depressed the efficiency of feed utilization.

Although the efficiency of nitrogen utilization was markedly decreased by the presence of excess of amino acids in the diet, nevertheless the ratio of fecal to dietary nitrogen did not change at the amino acid levels present in the experimental rations.

When wheat samples of different protein content were fed in rations containing no additional protein concentrates, growth rate and feed efficiency were slightly better with wheat of high protein content. High protein wheat (16.5%), however, gave slower growth and lower feed efficiency than wheat of average protein content (11 to 13%) when supplemented with fish meal to yield rations containing 17 to 21% of total protein. (Experiment Station Record)

MACHLIN, L. J., J. L. MILLIGAN, C. A. DENTON, and H. R. BIRD. *(U. S. Dept. Agric., Beltsville, Md.)* EFFECT OF VARIOUS AMINO ACIDS AND VITAMIN B_{12} ON CHICK GROWTH. *Fed. Proc. 9:* 364. 1950.—*An abstract.* (Biological Abstracts)

MILLER, O. NEAL, J. W. GODDARD, and ROBERT E. OLSON. PHYSIOLOGICAL AND HISTOLOGICAL CHANGES IN THE FOLIC ACID-DEFICIENT DUCKLING. *Fed. Proc. 9:* 366. 1950.—*An abstract.* (Biological Abstracts)

MILLIGAN, J. L., J. O. ANDERSON, G. F. COMBS, and G. M. BRIGGS. *(U. Maryland, College Park.)* DRIED PENICILLIN MYCELIUM AS A RIBOFLAVIN SOURCE IN CHICK RATIONS. *Poultry Sci. 29:* 870-873. 1950.—Dried penicillin mycelium, produced under commercial conditions, was found to serve satisfactorily as a riboflavin source for New Hampshire chicks fed a practical type starting ration low in riboflavin. When dried brewers' yeast was added as a riboflavin supplement, the growth response of chicks was consistently greater than that of chicks fed the same ration supplemented with an equivalent amt. of synthetic riboflavin. The data suggest that dried brewers' yeast, and perhaps other crude carriers of riboflavin, may supply important nutrients, other than riboflavin, which may be limiting factors in certain practical rations. The possibility that dried brewers' yeast supplied an unidentified chick growth factor is discussed.—*G. F. Combs.* (Biological Abstracts)

MILLIGAN, J. L., and G. F. COMBS. *(U. Maryland, College Park.)* VITAMIN B_{12} REQUIREMENTS FOR HATCHABILITY, VIABILITY AND GROWTH. *Poultry Sci. 29:* 772. 1950.—*An abstract.* (Biological Abstracts)

MORGAN, C. L. THE EFFECT OF VARIOUS LEVELS OF DISTILLERS GRAIN SOLUBLES IN A BROILER MASH UPON CHICK GROWTH, FEATHERING AND LITTER CONDITION. *Proc. Sixth Distillers Feed Conf., March 15, 1951.* p. 61.—In these trials Distillers Grain Solubles at all levels used in a broiler mash gave satisfactory growth, feed efficiency and feather development of the birds. Satisfactory litter conditions were maintained throughout a period of 10 weeks in floor brooding with levels of Distillers Solubles up to 10% in the ration. There was no evidence that Distillers Grain Solubles in the ration had any effect upon the moisture content of the litter. Under favorable price relationships Distillers Solubles may be utilized in increased amounts in broiler rations. (Experiment Station Record)

MUSSEHL, F. E., C. W. ACKERSON, and R. L. BORCHERS. A COMPARISON OF MASH AND GRANULES FOR CHICKS. *63rd Annual Report of Nebraska. May 1950.* p. 121.—A slight improvement in growth rate resulted from the use of the granulated ration. No significant improvement in growth rate resulted from the addition of a multiple vitamin supplement to base ration BX. (Experiment Station Record)

MUSSEHL, F. E., C. W. ACKERSON, and R. L. BORCHERS. GROWTH-PROMOTING VALUE OF MEAT SCRAPS. *63rd Annual Report of Nebraska. May 1950.* p. 121.—There is a significant variability in the growth-promoting value for chicks of different meat packing by-products. These differences are not logically explained on the basis of riboflavin, niacin, tryptophane or methionine values. Differences in B_{12}, or more broadly, "animal protein factors," may explain the differences in biological value of these specific concentrates. (Experiment Station Record)

MUSSEHL, F. E., C. W. ACKERSON, and R. L. BORCHERS. *(U. Nebraska, Lincoln.)* HOW MUCH ALFALFA MEAL IN CHICK RATIONS? *Poultry Sci. 29:* 773. 1950.—*An abstract.* (Biological Abstracts)

MUSSEHL, F. E., C. W. ACKERSON, and R. L. BORCHERS. *(U. Nebraska, Lincoln.)* MINERAL REQUIREMENTS FOR RAPID GROWTH IN NEW HAMPSHIRE CHICKS. *Poultry Sci. 29:* 773. 1950. —*An abstract.* (Biological Abstracts)

NIKOLAICZUK, N. FEEDING STANDARDS FOR POULTRY. *Canadian Jour. Comp. Med. and Vet. Sci. 14:* 358. 1950.—An abstract of the report of the Committee on Animal Nutrition of the National Research Council (U.S.) on "Recommended Nutrient Allowances for Poultry." These standards provide for a substantial margin of safety above the actual requirements for the known nutrients. Other factors that must receive consideration are dilution of prescribed feeds with grain, nutritional reserve of chicks at hatching, prolonged storage of feeds resulting in deterioration of essential nutrients, and management factors.—*R. Gwatkin.* (Biological Abstracts)

NIKOLAUCZUK, N. *(Macdonald Coll., Macdonald College, Que.)* THE ADVERSE EFFECT OF TEXTURE UPON THE FEEDING VALUE OF LINSEED OIL MEAL FOR CHICKS. *Poultry Sci. 29:* 773-774. 1950.—*An abstract.* (Biological Abstracts)

NORRIS, L. C. SOME NEW NUTRITIONAL INTERRELATIONSHIPS HAVING PRACTICAL IMPLICATIONS. *Proc. Sixth Distillers Feed Conf., March 15, 1951.* p. 50—The problem of nutritional interrelationships is not new but it has recently been given greater emphasis by the discovery that the requirement for a number of essential nutrients is conditioned by the amount of vitamin B_{12} stored in the body and the quantities supplied in the diet. In determining the requirement for any specific nutritive essential it is necessary to consider all the information which is available concerning the other nutritive essentials which affect the requirement for the one to be studied. (Experiment Station Record)

ODEJAR, DOMINGO Y. *(Bureau of Animal Industry, Manila.)* CHEMICAL ANALYSIS OF SOME COMMONLY USED PHILIPPINE FEEDS AND FEEDING STUFFS. *Philippine Journal of Animal Industry, 10:* 371-374. 1950.—This paper is a report of the chemical analysis of samples of feeding stuffs that have been submitted to the Biochemical Laboratory of the Veterinary Research Division, Bureau of Animal Industry, Manila, during the past two years.—*F. N. Fronda.*

OLCESE, ORLANDO, and J. R. COUCH. EFFECT OF INJECTING VITAMIN B_{12} INTO EGGS FROM HENS FED A DIET LOW IN VITAMIN B_{12}. *Poultry Sci. 29:* 612-614. 1950.—Injn. of vitamin B_{12} into eggs from hens fed a diet low in this vitamin promoted normal hatchability from the 6th through the 8th week, but failed to do so after the 9th week in a 17-week test. Injn. of the vitamin into the eggs prevented the occurrence of embryonic anomalies associated with B_{12} deficiencies throughout the exptl. period.—*Authors.* (Biological Abstracts)

OTT, WALTHER H. *(Merck Inst. Therap. Res., Rahway, N. J.)* FURTHER STUDIES OF THE ACTIVITY OF CRYSTALLINE

VITAMIN B_{12} FOR CHICK GROWTH. *Poultry Sci. 30:* 86-91. 1951.—A chick assay procedure was described which involves a diet composed of 70% soybean meal plus purified nutrients, and evidence was presented that the method appeared to be specific for vitamin B_{12} activity. The minimum vitamin B_{12} requirements for maximum early growth of chicks from hens fed an all-vegetable protein ration was estimated to be 2.7 μg./100 g. of diet when the high soybean meal ration was fed. Results with dried whey, alfalfa meal and certain other natural products suggested that the vitamin B_{12} requirements were increased by inclusion of these materials into the diet.—*W. H. Ott.* (Biological Abstracts)

PALAFOX, L., and M. M. ROSENBERG. *(U. Hawaii, Honolulu.)* DRIED COW MANURE AS A SUPPLEMENT IN A LAYER AND BREEDER RATION. *Poultry Sci. 30:* 136-142. 1951.—Oven- and air-dried cow manure, in 2 studies lasting 20 weeks, satisfactorily supported egg production, egg wt., body wt., hatchability, and feed consumption when fed at 5 and 10% of an all-mash ration. Air-dried cow manure fed at 15% of total mash intake satisfactorily supported egg production, egg wt., hatchability, and feed consumption but not body wt. when the diet was supplemented with herring meal so as to insure a minimum of 16% crude protein. Fifteen percent oven-dried manure, when nonsupplemented by herring meal, significantly depressed egg production after 12 weeks but did not significantly affect body weight. Oven-dried cow manure, when fed up to 15% of total mash intake, did not adversely affect egg quality. There were no significant differences between measurements taken on shell thickness, yolk height, yolk width, and percentage of thick albumen. The color of yolk was significantly affected only by the inclusion of 15% cow manure. This study was not repeated with air-dried manure.—*M. M. Rosenberg.* (Biological Abstracts)

PANDA, J. N., and G. F. COMBS. *(U. Maryland, College Park.)* STUDIES ON THE ENERGY REQUIREMENT OF THE CHICK FOR RAPID GROWTH. *Poultry Sci. 29:* 774-775. 1950.—*An abstract.* (Biological Abstracts)

PARTHASARATHY, D. *(Indian Vet. Res. Inst., Izatnagar, (U.P.) India.)* INFLUENCE OF SALT ON THE NITROGEN RETENTION OF LAYING HENS. *Poultry Sci. 29:* 480-481. 1950.—Data from N balance expts. suggest that the addition of 0.5% common salt to a ration consisting essentially of a mixture of wheat bran, corn, oats, paddy, wheat berseem and ground-nut cake meal improved the utilization of the dietary N.—*D. C. Hill.* (Biological Abstracts)

PATRICK, H. *(U. Tennessee, Knoxville.)* GROWTH PROMOTING EFFECT OF METHIONINE AND VITAMIN B_{12} ON CHICKS. *Poultry Sci. 29:* 923-924. 1950.—Synthetic vitamin B_{12} and methionine supplement chick rations containing raw soybean protein. When both were added, the growth response was no greater than when either of the supplements was used alone. The data suggested that vitamin B_{12} plays a role in the availability as well as the methionine requirement of chicks. —*H. Patrick.* (Biological Abstracts)

PATRICK, HOMER. *(U. Tennessee, Knoxville.)* STUDIES ON SUPPLEMENTS FOR HIGH SOYBEAN OIL MEAL RATIONS FOR EARLY POULT GROWTH. *Poultry Sci. 30:* 70-72. 1951.—Beltsville Small White turkey poults did not respond to supplement of synthetic vitmin B_{12} or some animal protein concentrates. They responded to supplements of fish meal, fish solubles and methanol solubles fraction of fish solubles. The requirement of the poult for vitamin B_{12} is probably much smaller than for chicks. The failure to obtain a response to this vitamin and the response to crude fractions containing this nutrient, also fish meal and fish solubles, suggests the requirement of another nutrient(s) for adequate poult nutrition.—*Homer Patrick* (Biological Abstracts)

PAYNE, L. F., and A. B. ERHART. NUTRITION STUDIES WITH TURKEYS. *Kansas' Fifteenth Biennial Report of the Director, for the*

Biennium July 1, 1948 to June 30, 1950. p. 72.—In 1948 the wheat-and -kafir diet gave the most economical growth. Feed cost per pound of gain was 14.33 cents, compared with 19.38 cents for a commercial mash, with wheat fed as whole grain. In 1949 the lot fed wheat, milo, and barley with a home-mixed mash gave a low cost of 13.74 cents per pound gain compared with the high-cost lot of 19.29 cents per pound gain where commercial mash and whole wheat were fed. (Experiment Station Record)

PEELER, H. T., R. F. MILLER, C. W. CARLSON, L. C. NORRIS, and G. F. HEUSER. *(Cornell U. Agric. Exptl. Sta., Ithaca, N. Y.)* STUDIES ON THE EFFECT OF VITAMIN B_{12} ON HATCHABILITY. *Poultry Sci. 30:* 11-17. 1951.—Hens kept in laying cages for a period exceeding a year on the corn-wheat-soybean meal diet produced eggs which were low in percentage fertility as detd. by the candling method. The percentage hatchability of fertile eggs as detd. by candling slowly declined when hens were placed on a corn-wheat-soybean meal diet. Injn. of vitamin B_{12} in the form of a concentrate or of crystalline vitamin B_{12} resulted, in 2 expts., in a sudden and dramatic increase in the percentage hatchability of fertile eggs to normal. The high hatchability rate was maintained for the duration of the expts. and was comparable to that of hens receiving a practical breeder diet. Using a technic for the detn. of true fertility in unincubated eggs, fertility was found to be approx. the same as that of the positive control group. The high infertility revealed by candling was thus shown to be caused in part by early embryonic mortality. Weekly injn. of vitamin B_{12} into the hen had no effect on this early embryonic mortality. Since the known vitamin content of the diet appeared adequate, the results indicated that an unidentified factor or factors in addition to vitamin B_{12} is required for hatchability of the eggs of hens fed the corn-wheat-soybean meal diet used in this investigation.—*Auth. summ.* (Biological Abstracts)

PEPPLER, H. J., and E. B. OBERG. *(Carnation Res. Labs., Milwaukee, Wisc.),* R. G. BENEDICT, and L. A. LINDENFELSER. *(Northern Region. Res. Lab., Peoria, Ill.)* THE EFFECT OF FEEDING CRUDE POLYMYXIN D ON THE INTESTINAL BACTERIA OF CHICKENS. *Poultry Sci. 29:* 520-526. 1950.—Crude carbon-adsorbed polymyxin D, containing 25,000 U. polymyxin per g. of carbon was fed to normal pullets at levels of 0.5 to 2.5% of the diet. The coliform counts of the intestinal flora were markedly reduced and birds receiving a 1.0% supplement gained 17% more weight than the untreated controls. No polymyxin was adsorbed through the gut. The sum of the gains evoked by the incorporation of carbon and polymyxin individually in the feed was approx. equal to the increases observed in the group which received both materials in the same supplement.—*Authors* (Biological Abstracts)

PETERSON, C. F., C. E. LAMPMAN, and A. C. WIESE. *(U. Idaho, Moscow.)* ROLE OF VITAMIN B_{12} AND OTHER APF FACTORS FOR REPRODUCTION AND CHICK GROWTH. *Poultry Sci. 29:* 775. 1950.—*An abstract.* (Biological Abstracts)

PETERSEN, C. F., A. C. WIESE, C. E. LAMPMAN, and R. V. DAHLSTROM. *(U. Idaho, Moscow.)* ROLE OF CRYSTALLINE VITAMIN B_{12} FOR HATCHABILITY. *Poultry Sci. 29:* 618-619. 1950.—96 White Leghorn pullets were placed in individual wire-bottom laying cages and fed a soybean oil meal-APF-deficient diet. When hatchability had dropped to approx. 15% they were divided into 6 groups of 16 hens each of equal hatchability. One group received the unsupplemented basal diet, 4 groups were given weekly injns. of either 0.5, 1.0, 2.0 or 4.0 μg. of vit. B_{12} per hen per week, and the diet of the 6th group was supplemented with 3% herring fish meal. The results of 6 weekly hatches showed that injecting 1.0, 2.0 or 4.0 μg. of B_{12} or feeding 3% fish meal raised the hatchability to over 90% within 3 weeks. These results demonstrate that vit. B_{12} is the essential part of the APF complex for reproduction in poultry.—*A. C. Wiese.* (Biological Abstracts)

PETERSON, D. W. EFFECT OF STEROLS ON THE GROWTH OF CHICKS FED HIGH ALFALFA DIETS OR A DIET CONTAINING QUILLAJA SAPONIN. *Jour. Nutr. 42:* 597, December 11, 1950.—Addition of both cholesterol and cottonseed oil to a diet containing 20% alfalfa meal completely prevented the growth depression otherwise produced in chicks on such a diet. An identical effect was obtained with cottonseed oil and a phytosterol mixture prepared from soybeans.

The growth depression produced by *Quillaja* saponin in the chick diet was also prevented by the addition of a mixture of cottonseed oil and cholesterol to the diet.

Raising the chicks' blood level of cholesterol by treatment with diethylstilbestrol was ineffective as a means of preventing the growth depression brought about by a high level of alfalfa meal in the diet. Counteraction of the alfalfa growth inhibitor or inhibitors was not dependent upon an increase in the plasma level of sterols determinable by the Liebermann-Burchard reaction. (Experiment Station Record)

PLATT, C. S. *(New Jersey Agric. Expt. Sta., New Brunswick.)* GREEN BANANA MEAL IN THE POULTRY RATION. *Poultry Sci. 29:* 614-615. 1950.—Green banana meal, a product made from the drying of the whole green fruit, including the peel as well as the pulp, was added to an all-mash ration for growing chicks, starting when they were 4 weeks old, at levels of 15 and 30% respectively, replacing corn meal. The growth of the chicks from the age of 4-8 weeks was slightly retarded by the substitution of the banana meal and feed efficiency was less, as indicated by the greater amt. of feed required to produce 1 lb. of gain when banana meal was incorporated in the diet.—*C. S. Platt.* (Biological Abstracts)

PREBLUDA, H. J. VITAMIN B_{12} SUPPLEMENTS. *Flour & Feed 51:* 35, April 1951.—Some commercial APF supplements marketed in the past have been found to contain antibiotics, but usually in such insignificant amounts as to be of little value from a nutritional standpoint, yet of great value for publicity purposes. Recent university work indicated that the level of antibiotic necessary to obtain a substantial increase in growth was far greater than had been supplied when the recommended amounts of various APF supplements derived from antibiotic production were added to a feed. The conflicting university reports on the value of APF supplements from antibiotic residues can be explained on the basis of differences in ration and a lack of standardized amounts of antibiotics in these products. (Experiment Station Record)

REED, J. R., and J. R. COUCH. *(A. and M. Coll., Texas, College Station.)* VITAMIN B_{12} AND APF CONCENTRATES IN THE NUTRITION OF THE GROWING CHICK. *Poultry Sci. 29:* 776-777. 1950. —*An abstract.* (Biological Abstracts)

REED, J. R. *(Texas Agric. Expt. Substa. 21, Gonzales.)*, and J. R. COUCH. *(Texas Agric. Expt. Sta., College Station.)* THE EFFICACY OF DIFFERENT APF CONCENTRATES FOR CHICKS. *Poultry Sci. 29:* 897-902. 1950.—Feeding tests have been carried out with groups of 200 to 280 chicks in pens with sand litter and under practical conditions. Two APF concentrates, fish meal and fish solubles, were tested with the vegetable protein type diet. One of the APF concentrates (No. 3) failed to have any growth promoting effect with chicks used in these tests, even though levels were used which varied from 0.018 to 0.35%. The other concentrate (199-B) produced a decided increase in the wt. of the chicks with each level fed up to 2% of the diet and, likewise, improved the feed efficiency. Fish meal and fish solubles were used in the diet as a positive control in this test. Growth of the birds fed concentrate 199-B for ten weeks was greater than that of those fed fish meal and fish solubles.—*Authors.* (Biological Abstracts)

RIEDEL, BERNARD B. *(U. Georgia, Athens.)* THE USE OF GRIT AND ITS EFFECT UPON ASCARID INFECTIONS. *Poultry Sci. 29:* 895-896. 1950.—The presence of grit in the diet of growing chickens did

not produce a significant increase in the wt. of broilers raised under controlled laboratory conditions. There was no evidence that the abrasive action of grit in the diet of growing chickens increased the hatchability of embryonated *Ascaridia galli* ova within the host to the extent that more ascarids were harbored.—*B. B. Riedel.* (Biological Abstracts)

REISER, R. THE ESSENTIAL ROLE OF FATTY ACIDS IN RATIONS FOR GROWING CHICKS. *Jour. Nutr. 42:* 319, November 10, 1950.—Polyunsaturated fatty acids are essential nutrients in the growth of chicks. (Experiment Station Record)

REISER, R. THE METABOLISM OF POLYUNSATURATED FATTY ACIDS IN GROWING CHICKS. *Jour. Nutr. 42:* 325, November 10, 1950.—On a fat-free ration the organ lipids of growing chicks retain the higher polyunsaturated fatty acids more tenaciously than the carcass lipids, and phospholipids more tenaciously than neutral fat.

Growing chicks convert dienoic acid to pentaenoic and possibly tetraenoic acids and convert trienoic acid to dienoic, tetraenoic, pentaenoic and hexaenoic.

The higher polyunsaturated fatty acids of cod liver oil are converted to dienoic acid.

Chicks cannot synthesize dienoic or trienoic acid, but produce their higher polyunsaturated acids from these. (Experiment Station Record)

ROBERTSON, E. I. *(John W. Eshelman and Sons, Lancaster, Pa.)* THE RESPONSE OF POULTS TO ANIMAL PROTEIN, FEED PARTICLE SIZE AND ANTI-BIOTICS. *Poultry Sci. 29:* 777. 1950.—*An abstract.* (Biological Abstracts)

ROBBI EE, A. R., and D. R. CLANDININ. *(U. Alberta, Edmonton, Alb.)* THE USE OF B VITAMINS IN PRACTICAL TURKEY STARTERS. *Poultry Sci. 29:* 777. 1950.—*An abstract.* (Biological Abstracts)

RUNNELS, T. D., A. E. TOMHAVE, E. G. KELLEY, and M. E. WALI. *(U. Delaware, Newark.)* GROWTH RESPONSE OF CHICKS FED DIETS CONTAINING SOLVENT EXTRACTED BROCCOLI MEAL AND SOYBEAN OIL MEAL AS PROTEIN SUPPLEMENTS. *Poultry Sci. 29:* 778. 1950.—*An abstract.* (Biological Abstracts)

RUNNELS, T. D., A. E. TOMHAVE, and A. F. KISH. *(U. Delaware, Newark.)* THE EFFECT OF FEEDING CHICKS A CONTINUOUS LOW LEVEL CONCENTRATION OF SULFAQUINOXALINE ON ULTIMATE EGG PRODUCTION, MORTALITY AND HATCHABILITY. *Poultry Sci. 29:* 778. 1950.—*An abstract.* (Biological Abstracts)

SANFORD, P. E. PROTEINS FOR BROILERS. *Kansas' 15th Biennial Report of the Director, for the Biennium July 1, 1948 to June 30, 1950.* p. 73—Of the various types of processed soybean oil meal tested it appeared that the solvent-extracted products gave more desirable results. (Experiment Station Record)

SAVAGE, J. E., B. L. O'DELL, H. L. KEMPSTER, and A. G. HOGAN. *(U. Missouri, Columbia.)* THE REQUIREMENT OF THE CHICK FOR AN UNRECOGNIZED GROWTH FACTOR. *Poultry Sci. 29:* 779. 1950.—*An abstract.* (Biological Abstracts)

SCOTT, H. M., and W. A. GLISTA. *(Illinois Agric. Expt. Sta., Urbana.)* THE EFFECT OF AUREOMYCIN AND ARSONIC ACID ON CHICK GROWTH. *Poultry Sci. 29:* 921-923. 1950.—A corn-soya ration, fortified with the known vitamins, including crystalline B_{12}, supported excellent chick growth. The addition of an APF supplement containing residual aureomycin, aureomycin HCl, 3-nitro-4-hydroxyphenyl arsonic acid or a combination of aureomycin and arsonic acid to this basal ration did not improve the growth obtained at eight weeks of age. All of the supplements to the basal gave a slight growth response during the

first four weeks with ad libitum feeding but no response when feed intake was equalized between treatments.—*Authors.* (Biological Abstracts)

SCOTT, M. L. LEG WEAKNESS IN TURKEYS CAN BE PREVENTED. *New York's Farm Research 17:* 3. April 1951.—The use of fish liver oil in turkey starting rations markedly aggravates the incidence of a leg weakness in young turkeys, which results primarily from the lack of an unknown nutrient in the diet.

On the other hand, dried brewers' yeast has been found very effective in preventing this disorder even in the presence of fish liver oil.

Four different experiments with various levels of fish liver oil (vitamin A and D feeding oil) showed that the incidence and severity of enlarged hocks bore a direct relationship to the amount of fish liver oil added to the basal diet.

Other experiments indicated that fish liver oil may aggravate the disorder by altering the growth of certain intestinal microorganisms which are ordinarily capable of synthesizing an unknown nutrient required for prevention of the disorder. Other substances known to alter the growth of intestinal bacteria have been found to have a marked effect upon the occurrence of leg weakness in turkeys. The feeding of diets high in lactose or in inorganic salts, both of which favor an acidophylic intestinal microflora, increased the incidence of enlarged hocks and leg weakness in turkeys. On the other hand, supplementing the diet with inositol and para-aminobenzoic acid markedly reduced the occurrence of leg weakness. However, inositol and para-aminobenzoic acid were ineffective in preventing the condition when supplied together with an antibiotic (aureomycin). Therefore these results indicate that the beneficial effect produced by these substances was due to stimulation of certain intestinal micro-organisms to synthesize an unknown required factor. (Experiment Station Record)

SCOTT, M. L. *(Cornell U., Ithaca, N. Y.)* STUDIES ON THE ENLARGED HOCK DISORDER (PEROSIS) IN TURKEYS. *Jour. Nutrition 40:* 611-624. 1950.—Four expts. were conducted to determine whether or not any of several combinations of choline, glycine, betaine, and vit. B_{12} was effective in completely preventing perosis in turkeys. An all-vegetable ration, complete in all known nutrients, was used as the primary basal diet. Substitutions of purified casein were made for soybean meal in some instances, in order to alter the choline, glycine and vit. B_{12} levels as desired. Supplementation of these diets with choline, glycine and vit. B_{12} alone and in various combinations showed that complete prevention of perosis occurred only when relatively high levels of choline and glycine were used, and then only in the presence of adequate vit. B_{12}. Additional results showed that 5% of fish meal plus 5% of meat scrap completely prevented perosis in the presence of a normal level of choline. Since the glycine content of the fish meal plus meat scrap was insufficient to account for this effect, it appears probable that these materials contain some unknown factor which is directly required, in addition to choline, to prevent the condition. Apparently the poult is capable of synthesizing this factor when given sufficiently high amts. of choline, glycine and vit. B_{12}. Betaine may be the required factor, since both betaine and sarcosine were found to be more active than glycine. On the other hand, creatine was also active.—*Auth.* (courtesy Wistar Bibl. Serv.).

SHERWOOD, R. M., and J. R. COUCH. *(A. and M. Coll., College Station, Texas.)* THE EFFECT ON CHICK GROWTH OF SUPPLEMENTING A VEGETABLE PROTEIN DIET WITH AN APF CONCENTRATE. *Poultry Sci. 29:* 501-507. 1950.—The present report shows that soybean oil meal and cottonseed meal of low gossypol content may each be used as the sole source of protein for growing chicks when properly supplemented. Soybean oil meal supplemented with 1% Lederle APF concentrate supported growth equivalent to that obtained with 4% fish solubles under the same conditions. On the other hand, it was necessary to supplement cottonseed meal with DL-lysine and an APF concentrate or fish solubles when this feed was used as the protein source.—*Authors.* (Biological Abstracts)

SINGSEN, E. P., L. D. MATTERSON, and ANNA KOZEFF. *(U. Connecticut, Storrs.)* THE EFFECT OF THE SOURCE OF CARBOHYDRATE ON THE FEED EFFICIENCY OF LAYING HENS. *Poultry Sci. 29:* 779-780. 1950.—*An abstract.* (Biological Abstracts)

SINGSEN, E. P., L. D. MATTERSON, ANNA KOZEFF, and LOIS DECKER. *(U. Connecticut, Storrs.)* THE CHOLINE REQUIREMENTS OF TURKEY BREEDERS. *Poultry Sci. 29:* 780. 1950.—*An abstract.* (Biological Abstracts)

SKINNER, J. L., and J. H. QUISENBERRY. *(A. and M. Coll. Texas, College Station.)* SOME EFFECTS OF HIGH EFFICIENCY AND B_{12} IN CHICKEN BREEDER RATIONS. *Poultry Sci. 29:* 780. 1950.—*An abstract.* (Biological Abstracts)

SLINGER, S. J., W. F. PEPPER, and I. MOTZOK. *(Ontario Agric. Coll., Guelph.)* FACTORS AFFECTING THE SALT REQUIREMENTS OF CHICKENS. *Poultry Sci. 29:* 780-781. 1950.—*An abstract.* (Biological Abstracts)

SLINGER, S. J., I. MOTZOK, and W. F. PEPPER. *(Ontario Agric. Coll., Guelph, Canada.)* THE EFFECT OF SALT, MANGANESE AND APF SUPPLEMENTS ON GROWTH AND BONE FORMATION IN POULTS. *Poultry Sci. 30:* 153-156. 1951.—Growth and feed efficiency of Broad Breasted Bronze turkey poults, fed diets varying in salt and Mn, were improved by the addition of an APF supplement containing vitamin B_{12} and penicillin, as compared to similar diets but without the antibiotic. Penicillin also reduced individual variation in wt. Addition of 8 ounces of technical manganese sulfate per ton of feed, resulting in a Mn content of 32 mg./lb. caused growth inhibition and tended to reduce percentage bone ash. Adding 1% of salt to the diets increased the incidence of leg abnormalities as compared with diets not containing added salt. Mn was of no value in correcting these conditions but the presence of penicillin resulted in complete absence of leg disorders. Salt additions increased the % ash of the fat-free dry tibiae, while penicillin caused a reduction in the bone ash. The changes in plasma alkaline phosphatase activity were, in general, inversely correlated with alterations in percentage bone ash.—*S. J. Slinger.* (Biological Abstracts)

SLINGER, S. J., K. M. GARTLEY, W. F. PEPPER, and D. C. HILL. THE INFLUENCE OF ANIMAL PROTEIN FACTOR SUPPLEMENTS AND ANTIBIOTICS ON THE INCIDENCE AND SEVERITY OF WHITE FEATHERS IN TURKEYS. *Jour. Nutr. 43:* 345, March 10, 1951.—The increase in severity of white feathers with a lysine-deficient diet and the production of the disorder with a 20% protein diet containing 1.2% of lysine, by the addition of an APF supplement or antibiotics, suggest that these materials increase the dietary level of lysine required for normal feather pigmentation. The fact that the APF supplements or antibiotics resulted simultaneously in an increase in growth and a higher incidence of white feathers with diets containing 1.2% of lysine suggests that the growth requirement for this amino acid takes precedence over the feather pigmentation requirement.

The much greater response to APF and antibiotics using a 28 rather than a 20% protein diet may indicate that to reach the maximum potential growth under the influence of these materials the requirement for other amino acids, as well as lysine, is also increased. (Experiment Station Record)

SMITH, E. L. THE VITAMIN B_{12} GROUP OF FACTORS. *British Med. Jour. Saturday, January 27, 1951.* p. 151.—Progress in the vitamin B_{12} field has been so rapid that it seems already appropriate to supplement the review published in the *Journal* a year ago (Lester Smith, 1949). In particular, it has been found possible to obtain in crystalline form two further members of the vitamin B_{12} group of factors—namely, vitamins $B_{12}c$ and $B_{12}d$—as recently announced by workers in these laboratories (Anslow et al., 1950). (Experiment Station Record)

SQUIBB, R. L., A. FALLA, J. A. FUENTES, and H. T. LOVE. *(Inst. Agropecuario Nacion., Guatemala City.)* VALUE OF DESMODIUM, PIGEONPEA FODDER, AND GUATEMALAN AND UNITED STATES ALFALFA MEALS IN RATIONS FOR BABY CHICKS. *Poultry Sci. 29:* 482-485. 1950.—*Desmodium* meal and, to a lesser extent, pigeonpea fodder meal, may replace alfalfa meal as a source of carotene and other essential nutrients in baby chick rations. This is of importance for Latin American tropical regions as alfalfa grows in a limited number of restricted areas and numerous spp. of *Desmodium* grow abundantly throughout the tropics. Pigeonpeas yield good fodder crops in certain areas and may be used to supplement the production of *Desmodium* meals.—*R. L. Squibb.* (Biological Abstracts)

SQUIBB, R. L., and M. K. WYLD. *(Inst. Agropecuario Nacion., Guatemala.)* FURTHER STUDIES ON THE VALUE OF DESMODIUM MEAL IN THE BABY CHICK DIET. *Poultry Sci. 29:* 586-589. 1950.—*D. intortum* meal was added, at 5, 10, 15, and 20% levels, to 2 basal rations for baby chicks: The 1st contained sesame oil meal; the 2d, corozo palm nut, cottonseed, and sesame oil meals. In the 1st ration, as percentages of *Desmodium* meal were increased, chicks grew more, mortality decreased, and utilization of feed increased; and, at the 10% level or above, notched beak disease did not appear. In the 2d ration, as percentages were increased, growth and feed utilization were depressed, but at no level was notched beak disease observed.—*R. L. Squibb.* (Biological Abstracts)

STEWART, W. I., and CHARLES W. UPP. *(Louisiana State U., Baton Rouge.)* THE EFFECT OF FORM OF FEED ON GROWTH AND FEED EFFICIENCY, PELLETS VERSUS MASH VERSUS GRANULES FOR BROILERS. *Poultry Sci. 30:* 63-66. 1951.—Diets of identical formula were supplied in pellet, granular and regular mash form to lots of 100 White Plymouth Rock chicks of both sexes. These were floor brooded under electric brooders from day-old to 12 weeks of age. Of 3 trials, 2 were conducted during fall-winter and 1 during the spring. The rate of growth and efficiency of feed utilization were checked at weekly intervals. The form of feed did not greatly affect the rate of growth nor the feed efficiency although granules produced somewhat more efficient gains in two of three trials and greater gains in one trial. No appreciable differences existed in the market quality of dressed birds. Feather picking or cannibalism was not a problem of consequence.—*C. W. Upp.* (Biological Abstracts)

SUNDE, M. L., W. W. CRAVENS, C. A. ELVEHJEM, and J. G. HALPIN. *(U. Wisconsin, Madison.)* SUPPLEMENTS WHICH PROMOTE CHICK GROWTH WHEN ADDED TO DIETS CONTAINING ISOLATED SOYBEAN PROTEIN. *Poultry Sci. 29:* 627-629. 1950.—Chicks fed an isolated soybean protein as a protein source and sucrose as the carbohydrate failed to grow well and died before they were 2 weeks old. All the known vitamins including vit. B_{12} and 3 amino acids were included in the basal ration. The addition of 20% corn, 10% wheat bran or middlings, or a combination of 10% yeast and 10% dried whey with fermentation solubles, to the basal diet did support fairly normal growth and reduced the mortality at 4 weeks to zero. The substitution of autoclaved corn starch for the sucrose resulted in satisfactory growth and no mortality occurred. The addition of APF concentrates from aureomycin or streptomycin residues did not prevent the mortality but delayed it for a few days. Some materials found ineffective are 7.5% hot alcohol-extracted casein, 3% fish solubles, 3-5% whole liver powder, 5% dried alfalfa leaf meal, 5% dried skim milk, 10% soybean oil meal and 5% dried sheep manure. *Authors.* (Biological Abstracts)

SURE, B., and L. EASTERLING. THE PROTECTIVE ACTION OF VITAMIN B_{12} AGAINST THE TOXICITY OF DL-THYROXINE. *Jour. Nutr. 42:* 221, October 10, 1950.—When rations containing soybean meal are employed, the retardation in growth caused by dessicated thyroid or iodinated casein has been counteracted in the rat and chick by

crystalline vitamin B_{12}. In the present communication experimental evidence is presented on the basis of which it is evident that 0.2 to 0.5 μg. daily of crystalline vitamin B_{12} not only protects against the entire collapse produced by subcutaneous injections of 0.2 mg. daily of DL-thyroxine, but also permits considerable growth to take place. (Experiment Station Record)

SWENSON, M. J. *(Iowa State Coll., Ames.)* EFFECT OF A VITAMIN B_{12} CONCENTRATE AND LIVER MEAL ON GROWTH AND FEED EFFICIENCY OF CHICKS FED AN ALL-PLANT PROTEIN RATION. *Poultry Sci. 30:* 55-62. 1951.—Three groups of chicks (10 in each group) were fed a basal ration whose protein was of all-plant origin, 3 other groups were fed the same ration except 3% liver meal replaced 3% soybean meal, and the remaining 3 groups were fed a 0.5% APF concentrate in place of 0.5% soybean meal. The latter ration contained 62.5 μg. of vitamin B_{12} per pound by the L.L.D. method of assay. The treatments produced a highly significant difference statistically (1% level) in the wt. gains of the 45 female chicks for the first 10 weeks of the expt. and a significant difference (5% level) at 12 weeks of age. The wt. gains of the 45 male chicks were found to be significantly different among the chicks receiving the three rations for the first 2 weeks and no significant difference during the balance of the expt. A highly significant difference was present between wt. gains of female chicks fed the basal and liver meal rations throughout the expt., whereas this difference existed only at 2 weeks of age in male chicks. A significant difference was present between the wt. gains of male chicks fed the basal and liver meal rations at 4 and 8 weeks of age. A highly significant difference existed between the wt. gains of female chicks fed the basal and APF rations at 4 and 6 weeks of age while a significant difference occurred between the weight gains of female chicks at 2, 8, and 10 weeks of age and at 2 weeks of age for male chicks. Female chicks did not gain as rapidly as male chicks and the standard errors of the means were smaller for female chicks. Environmental effects produced a highly significant difference in the wt. gains of male chicks at 4, 6, and 8 weeks of age and a significant difference at 10 weeks. This expt. indicates that female chicks should be a better assay animal for vitamin B_{12} than male chicks due to the smaller standard error of the means of wt. gains and the absence of significant environmental effects. The feed efficiency of the chicks fed the liver meal ration was the best throughout the expt. followed in order by those fed the APF and basal rations to 8 weeks of age, whereas the chicks fed the APF ration showed the poorest feed efficiency thereafter. A highly significant difference was present between the feed efficiency of chicks fed the basal and liver meal rations and also between those fed the APF and liver meal rations while a significant difference in feed efficiency did not exist between the chicks fed the basal and APF rations.—*M. J. Swenson.* (Biological Abstracts)

THAYER, R. H. FEEDING ANTIBIOTICS TO CHICKS. *Flour & Feed 51:* 38, April 1951.—It has been demonstrated recently, however, that rate of growth can be increased by intravenous or intramuscular injections of penicillin. In addition, penicillin appears to exert a growth promoting effect in the absence of functional ceca. Since the ceca are the site of the greatest numbers of intestinal bacteria, it would appear from these data that the changes in intestinal flora might not fully explain the results which are obtained.

Data indicate that the feeding of antibiotics to growing chicks lowers the chick's requirement for protein, dietary energy, vitamin B_{12} and the B-complex vitamins.

Results indicate that antibiotics may exert a sparing action on dietary energy.

A similar sparing action exists between penicillin and the B-complex vitamins. Vitamin levels which normally are inadequate for satisfactory chick growth will support satisfactory growth if penicillin is added to the ration. (Experiment Station Record)

THAYER, ROLLIN H., K. C. LEONG, and JAMES McGINNIS. *(Washington State Coll., Pullman.)* COMPARATIVE NUTRITIVE VALUE OF SPECIFIC VEGETABLE AND ANIMAL PROTEIN CONCENTRATES FOR CHICKS. *Poultry Sci. 29:* 782. 1950.—*An abstract.* (Biological Abstracts)

THOMPSON, S. Y., M. E. COATES and S. K. KON. THE CONVERSION OF CAROTENE TO VITAMIN A IN THE INTESTINE OF THE CHICK. *Biochem. Jour. 46:* xxx. May 1950.—Vitamin A appeared in the intestinal wall within 0.5 hr., the shortest time interval studied, whereas the liver stores did not increase appreciably till 3.5 hr. later. For this reason chicks are likely to prove specially suitable for the study of the intestinal conversion of carotene. They are so easily rendered deficient that they may also be of value for the biological assay of vitamin A. (Experiment Station Record)

VAN REEN, R., M. W. TAYLOR and W. C. RUSSELL. THE VITAMIN A REQUIREMENT OF THE TURKEY POULT FED A PURIFIED DIET. *Jour. Nutr. 43:* 235, February 10, 1951.—When Jersey Buff turkey poults were fed a purified diet containing graded levels of vitamin A, 300 I.U. per 100 gm. gave nearly as good growth as 500 I.U. or 600 I.U., but a level of 500 I.U. was necessary to prevent gross external and internal signs of A-avitaminosis. It is recognized that higher levels of vitamin A may be necessary for the prevention of microscopic signs of deficiency. (Experiment Station Record)

WILDER, O. H. M. THE USE OF PACKING HOUSE BY-PRODUCTS FOR ANIMAL FEEDS. *Food Technology 5:* 118, March 1951. —The various packing house by-products used as animal feed (especially for swine and chicks) are discussed together with the role of high-protein concentrates, the "animal protein factor" and the economic aspects of animal feeding.

Meat scrap, or meat and bone scrap, has been used chiefly in poultry feeding because it does not contain blood, and poultry men have always felt that it was more readily consumed by poultry than was tankage. The shortage of tryptophan was of little consequence because poultry rations tended to be more complicated than pig rations and contained other ingredients that had a good supply of tryptophan. (Experiment Station Record)

WILLIAMS, I. L., and H. J. PHILLIPS. RANCIDITY IN CHICKEN FAT. *63rd Annual Report of Nebraska.* May 1950. p. 125.—A preliminary analysis for peroxide values in the fat of each group 14 days after the birds were killed and dressed shows greatest rancidity in the vitamin E-deficient group, a slight trace in the control group, and no evidence of rancidity in the ammonia or vitamin E-excess group. (Experiment Station Record)

WOODS, R. *The Borden Company.* NUTRITION HIGHLIGHTS. *Flour & Feed 51:* 32, April 1951.—*Folinic Acid:* The use of the microorganism Leu-conostoc citrovorum for microbiological assays in 1948 led to the discovery of a new vitamin factor closely allied to folic acid. In the two years that followed considerable study of the citrovorum factor (CF) has been made by several groups of investigators, culminating last year in evidence elucidating its relation to folic acid and establishing its probable identity with a similar factor described as "folinic acid." (Experiment Station Record)

ZACHARIAS, L., P. GOLDHABER and V. E. KINSEY. VITAMIN E DEFICIENCY IN CHICKS.—I. THE EFFECTS OF DIETARY SUPPLEMENTS ON PLASMA TOCOPHEROL LEVELS AND VITAMIN E DEFICIENCY SYMPTOMS. *Jour. Nutr. 42:* 359, November 10, 1950.—The chief symptom of vitamin E deficiency observed in these experiments was encephalomalacia; cases of exudative diathesis and of gizzard necrosis were also observed. No ocular abnormalities were found.

Deficiency symptoms occurred only when cod liver oil was a constitu-

ent of the diet.

The plasma tocopherol levels of chicks fed the a-tocopherol-supplemented diets were lower by the administration of a water-miscible multiple vitamin preparation, cod liver oil, or crystalline vitamin A. Iron supplements, in either the ferric or ferrous form, had no effect.

Chicks showing plasma tocopherol levels of approximately 1.0 mg. % or more never developed symptoms. Chicks having plasma tocopherol levels of approximately 0.5 mg. % or less developed symptoms only when fed certain diets. Chicks did not develop symptoms when fed the vitamin E-deficient basal diet supplemented with the multi-vitamin preparation, or when fed the natural diet supplemented with 5% cod liver oil. In both these groups, cod liver oil was present in the diet and the plasma tocopherol levels were as low as those of chicks receiving the vitamin E-deficient basal diet. The absence of symptoms in these two groups indicates that there are substances other than vitamin E, present in the natural diet and in the multi-vitamin preparation, which protect chicks from vitamin E deficiency symptoms.

The protective factor in the multi-vitamin preparation was found to be ascorbic acid. (Experiment Station Record)

FACTS ABOUT PHOSPHORUS SUPPLEMENTS. Domestic Production, Imports, Supply Outlook and Nutritional Evaluation. *Feedstuffs 23:* 12, March 24, 1951. (Experiment Station Record)

PATHOLOGY

BEARD, W. A. *Greenview Illinois.* COCCIDIOSIS. *North American Veterinarian 32:* 268, April 1951. (Experiment Station Record)

BRESSLER, G. O., E. W. CALLENBACH, and S. GORDEUK. *(Pennsylvania State Coll., State College, Pa.)* THE ROLE OF SALT AND CARBOLINEUM IN PRODUCING ASCITES IN TURKEY POULTS. *Poultry Sci. 29:* 749-750. 1950.—*An abstract.* (Biological Abstracts)

BRESSLER, G. O., and S. GORDEUK. *(Pennsylvania State Coll., State College, Pa.)* EFFECT OF CECAL COCCIDIOSIS ON BODY WEIGHT, EGG PRODUCTION AND HATCHABILITY IN CHICKENS. *Poultry Sci. 29:* 750. 1950.—*An abstract.* (Biological Abstracts)

BRUNSON, CLAYTON C., and GEORGE F. GODFREY. *(Oklahoma A. and M. Coll., Stillwater.)* A THIRTEEN-YEAR SUMMARY OF MORTALITY IN THE OKLAHOMA EGG LAYING CONTEST. *Poultry Sci. 29:* 751. 1950.—*An abstract.* (Biological Abstracts)

CHANDLER, L. U. NUTRITIONAL ASPECTS OF RESISTANCE. *Jour. Am. Vet. Med. Assn. 118:* 256, April 1951.—An adequate supply of protein is essential for resistance to disease. High levels appear to discourage intestinal parasites. Carbohydrates on the other hand tend to favor intestinal parasites.

Vitamins vary in their effect.

The role of the intestinal mucosa and intestinal motility in resistance appears to be very important. It has been suggested that the mechanics of epithelial cell replacement might be further investigated to advantage. The effect of hormones is another aspect that might well be considered. Nutrition is an important factor in resistance to disease. (Experiment Station Record)

GORDEUK, S., G. O. BRESSLER, and P. J. GLANTZ. *(Pennsylvania State Coll., State College, Pa.)* EFFECT OF AGE OF BIRD AND DEGREE OF EXPOSURE IN THE DEVELOPMENT OF IMMUNITY IN CECAL COCCIDIOSIS OF CHICKS. *Poultry Sci. 29:* 760. 1950. —*An abstract.* (Biological Abstracts)

GRUMBLES, L. C., and W. A. BONEY. POULTRY DISEASES. *North American Veterinarian 32:* 235, April 1951. (Experiment Station Record)

HANNKEN, P. B. EXPERIMENTS WITH "GAMMEXANE" IN THE CONTROL OF LICE ON POULTRY AND THEIR BEARING ON THE PROBLEM OF VITAMIN D INTAKE. *Nature* [*London*] *165:* 451. 1950.—5% Benzene hexachloride powder gave complete control of body lice when dusted on birds, perches or litter. There was no taint of eggs or flesh from the first two methods, but heavy taint when grain was eaten from dusted litter. Birds must not ingest preen oil from feathers, since in dusted birds this would be contaminated with BHC. Earlier workers, finding vitamin D in oil, after sun irradiation, suggested utilization through ingestion while preening. The author suggests a direct absorption. A similar process may occur in mammals.—*P. B. Hannken.* (Biological Abstracts)

KNOX, CHARLES W. *(U. S. Dept. Agric., Beltsville, Md.)* THE EFFECT OF NEWCASTLE DISEASE ON EGG PRODUCTION, EGG WEIGHT AND MORTALITY WEIGHT. *Poultry Sci. 29:* 907-911. 1950. —Newcastle disease affected egg production adversely but was less severe on incrossbred pullets, than on either outbred Rhode Island Reds or crossbreds. Egg production, calculated in 4-week periods, decreased during the epizootic to 40% for the incrossbreds, 34% for the crossbreds and 17% for the outbreds. The epizootic probably had a 12 week effect on egg production, 6 weeks to the lowest level and 6 weeks before normal production was attained. This effect caused a lower annual egg avg. than during normal yrs. with the annual egg production of the incrossbreds being affected the least. Avg. egg wt. was lowered during this 12 week period and affected the annual avg. egg wt. to an even greater degree. All groups were affected equally in respect to this characteristic. Very little if any increase in the rate of mortality was encountered in any of the groups during the epizootic, however, greater rate of mortality was found in all groups for the year. There was greater mortality rate previous to and-subsequent to the 12-week epizootic period. Both the outbred and incrossbred groups were affected in respect to the mortality rate—*C. W. Knox.* (Biological Abstracts)

QUILLIGAN, J. J. JR., T. FRANCIS, JR., R. J. ROWE, D. G. TRAGGIS, J. D. ADCOCK and H. KURTZ. THE ACTION OF TERRAMYCIN ON THE GROWTH OF STRAINS OF INFLUENZA, HERPES SIMPLEX, AND RABIES VIRUSES IN CHICK EMBRYOS AND MICE. *Annals of the New York Academy of Sciences, Vol. 53, Art. 2, p. 407,* September 15, 1950.—The effect of the sodium salt of terramycin on experimental infection of chick embryos with influenza virus results in suppression of viral multiplication if the toxic level of the drug is approached and if the material is given before the virus. No effect was observed on the course of Type A influenza virus infection in mice; on the growth of strains of herpes simplex virus in chick embryos and mice; or on the multiplication of a strain of rabies virus in mice. (Experiment Station Record)

RAMASWAMY, A. S., R. RAMA RAO, and N. N. DE. *Indian Inst. Sci., Bangalore.)* STUDIES ON THE ANAEMIA IN CHICKS INFECTED WITH P. GALLINACEUM. *Proc. Indian Acad. Sci. Sect. B. 32:* 126-132. Illus. 1950.—Anemia in chicks produced by *Plasmodium gallinaceum* shows the following characteristics: a slightly lowered color index, hyperplasia of the bone marrow associated with a drop in the red cell count, and slightly raised mean red cell area. Small late erythroblasts which are spherical occur in the peripheral blood when the maximum strain is placed on the hematopoietic tissues, and normal elliptical erythrocytes are found in the peripheral blood as the bird recovers from the acute infection. It is interesting to note that the rapid reduction in the number of parasites following the peak of the parasitemia may be related to the preference of the parasites for erythrocytes over erythroblasts.—*Auth. summ.* (Biological Abstracts)

RIEDEL, BERNARD B. *(Southwestern Coll., Winfield, Kansas.)* ASCARID INFECTIONS IN BROILERS RAISED ON DIRT AND CONCRETE FLOORS. *Poultry Sci. 30:* 18-20. 1951.—Numerous flocks of broilers were raised in concrete and dirt floor houses to determine the incidence of ascariasis under natural conditions. The results showed that the incidence of ascariasis was no higher among broilers raised on a dirt floor covered with a 6-inch depth of wood shavings than it was among broilers raised on a concrete floor covered with a similar depth of wood shavings. Evidence indicated that the incidence of *Ascaridia galli* could be kept at a harmless level by practical sanitary procedures without the use of anthelmintics.—*B. B. Riedel.* (Biological Abstracts)

SHARPLESS, GEORGE R., J. J. OLESON, PAUL LITTLE, and MAURICE C. DAVIES. *(Lederle Lab. Div., American Cyanamid Co., Pearl River, N. Y.)* THE EFFECT OF PTEROYLGLUTAMIC ACID ON THREE TYPES OF NEOPLASTIC DISEASE IN CHICKENS. *Poultry Sci. 29:* 818-823. 1950.—The development of erythroblastosis, Rous sarcoma or a transplanted lymphoid tumor in chicks was inhibited by feeding a diet deficient in pteroylglutamic acid (PGA) or by injecting a PGA antagonist into chicks receiving a normal diet. The PGA requirement was similar for all 3 types of neoplastic disease.—*Authors.* (Biological Abstracts)

TAYLOR, LEWIS, W., CECIL A. GUNNIS, C. R. GRAU, and S. LEPKOVSKY. *(U. California, Berkeley.)* EFFECT OF A RESPIRATORY DISEASE ON REPRODUCTION [IN WHITE LEGHORN PULLETS]. *Poultry Sci. 29:* 782. 1950.—*An abstract.* (Biological Abstracts)

WINTON, BERLEY. *(U. S. Region Poultry Lab., E. Lansing, Mich.)* EUGENE H. LUCAS *(Michigan State Coll., E. Lansing.),* and GEORGE E. COTTRAL. *U. S. Region. Poultry Lab., E. Lansing, Mich.)* THE EFFECTS OF FEEDING TOMATOES ON THE INCIDENCE OF LYMPHOMATOSIS IN CHICKENS. *Poultry Sci 29:* 912-915. 1950.—The use of fresh and frozen tomatoes in the diet of chickens did not reduce significantly the incidence of lymphomatosis during a 360-day period. There was some evidence that the tomatoes had a mild laxative effect on the chickens in the second experiment when their feed was limited to mash and tomatoes, and at the exclusion of water.—*Berley Winton.* (Biological Abstracts)

NEWCASTLE DISEASE. *Report of the Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii, Biennial Period Ending June 30, 1950.* p. 18.—A new experimental live-virus vaccine for Newcastle disease was furnished us for trial by Lederle Laboratories. It was prepared from the so-called Blacksburg strain of virus, to be administered intranasally. Large scale experiments proved that this vaccine, when properly administered to day old chicks produced a satisfactory immunity to Newcastle disease for the first few months of life. (Experiment Station Record)

PSEUDOMONIASIS. *(Bimonthly Bull., North Dakota Agric. Exper. Sta., Nov.-Dec., 1950:* 59-61.) *Jour. Am. Vet. Med. Assn. 118:* 322, May 1951.—Water high in sodium salts will produce lesions similar to those of pseudomoniasis—namely, a generalized edema.

Predisposing factors in pseudomoniasis are chilling, malnutrition, debeaking, removal of the distal portion of one wing, wing banding, sinusitis of turkeys, and insanitary pens.

Treatment consists of implanting streptomycin-penicillin pellets. Administration of sulfonamides, streptomycin and penicillin, and streptomycin in water were only moderately effective under similar conditions. (Experiment Station Record)

POULTRY PRODUCTS AND MARKETING

BAUM, E. L., and H. G. WALKUP. *(State Coll. Washington, Pullman.)* PROBLEMS IN POULTRY MEAT PRODUCTION IN THE PACIFIC NORTHWEST. *Poultry Sci. 29:* 858-861. 1950.—The economics of poultry meat production is discussed from a viewpoint of growing period stages. A plea is made for exptl. data to be broken down into increments throughout the whole growth period rather than averaged at some arbitrary selected point. (Biological Abstracts.)

BOSE, S., and T. D. MAHADEVAN. *(Indian Vet. Res. Inst., Izatnagar.)* THE EFFECTS OF HEAT TREATMENT AND LIME SEALING ON THE PRESERVATION OF SHELL EGGS. *Indian Jour. Vet. Sci. and Animal Husbandry 19:* 229-232. 1949.—Treatment of eggs in a water bath at 130°F. for 15 min. or longer, killed the embryos and stabilized the quality of shell eggs. Eggs so treated were edible for 14 days (avg. temp. 92°F., relative humidity 45%), and for over 28 days at 60°F. Lime sealing carried out with heat treatment, exercised a complementary effect on the albumen and yolk quality of heat treated eggs by preventing the escape of moisture and CO_2 through the shell pores. —*N. N. Dastur.* (Biological Abstracts)

CLINGER, C., A. YOUNG, I. PRUDENT and A. R. WINTER. THE INFLUENCE OF PASTEURIZATION, FREEZING, AND STORAGE ON THE FUNCTIONAL PROPERTIES OF EGG WHITE. *Food Technology 5:* 166. April 1951.—Egg white pasteurized at 134°F. (57°C.) for 4 minutes produced undesirable angel food cakes unless the standard beating procedure was modified.

Satisfactory cakes, but not of optimum quality, were produced with pasteurized white when the beating speed and time were practically doubled during first beating and meringue stage, and then reduced correspondingly during the preparation of the batter.

Cakes made from frozen egg white had nearly as good cake volumes as those produced from fresh egg whites. Judging scores were as good, or better with the frozen whites.

Freshly frozen egg white produced as good cakes as that which had been frozen as long as 24 weeks.

Egg white frozen and stored at 10°, 0°, —10°, and —20° F. for as long as 54 weeks produced angel food cakes of similar volume and score. (Experiment Station Record)

COOPER, G. H. FACTORS INFLUENCING EGG QUALITY ON THE FARM. *Rhodesia Agric. Jour. 47:* 9-13. 1950.—Two essential factors that adversely affect the delivery of good eggs are: distance and poor transport facilities, and high summer temps. and low humidity. Other factors discussed are: feed, nests, laying house management, fertile eggs, clean eggs, holding eggs, and packing and dispatching eggs.—*W. W. Jones.* (Biological Abstracts)

EVANS, ROBERT JOHN, H. A. BUTTS, and J. A. DAVIDSON. *(Michigan State Coll., E. Lansing.)* THE NIACIN CONTENT OF FRESH AND STORED SHELL EGGS. *Poultry Sci. 30:* 132-135. 1951. —Fifteen consecutive eggs from each of 10 hens kept in laying cages and fed a diet of constant composition were used. Samples of 3 eggs each from each hen were assayed fresh and after 3, 7, and 12 mos. of storage for niacin with *Lactobacillus arabinosus.* Fresh shell eggs contained on the avg. 31.3 μg. of niacin per egg or 0.66 μg./g. Most of the niacin (28.5 or 0.93 μg./g.) was in the albumen, and only 2.8 μg. (0.16 μg./g.) was in the yolk. An avg. loss of 5.5 μg. of niacin occurred during 7 mos. of cold storage. Despite a loss of water from the eggs the niacin concn. also decreased to 0.54 μg. 1g. The avg. niacin content of the yolks of 7-months-old eggs was 4.1μg. with a concn. of 0.22 μg./g. of yolk and that of the albumen was 21.8 μg. (0.74 μg./g.). Data from 12-mo.-old eggs could not be used because of spoilage.—*R. J. Evans.* (Biological Abstracts)

EVANS, ROBERT JOHN, and J. A. DAVIDSON. *(Michigan State Coll., E. Lansing.)* THE CHOLINE CONTENT OF FRESH AND STORED SHELL EGGS. *Poultry Sci. 30:* 29-33. 1951.—Hens kept in laying cages were fed a diet of constant composition. 15 consecutive eggs from each of 10 hens were used in the study. Three-egg samples from each hen were analyzed fresh and after 3, 7, and 12 mos. of storage by the reineckate method. Fresh egg yolks contained 14.9 mg. of choline per g. of yolk or 251 mg. per egg yolk. Fresh egg albumen contained only 0.4 mg. per egg, so that the choline content of the fresh eggs was essentially the same as that of the yolks. No losses of choline from the egg occurred during 12 mos. of cold storage. The choline content of the albumen of 12-month-old eggs was on an avg. 8 times as large as that of fresh eggs, indicating a transfer of choline from the yolk to the albumen in very small quantities. A transfer of water and, perhaps, some albumen solids to the yolks also occurred, which explains an apparent decrease in choline concn. in the yolk during storage.—*R. J. Evans.* (Biological Abstracts)

FURMAN, D. P., and R. A. BANKOWSKI. *(U. California, Berkeley.)* ABSORPTION OF BENZENE HEXACHLORIDE IN POULTRY. *Jour. Econ. Ent. 42:* 980-982. 1949.—As demonstrated by a microbioassay technic, benzene hexachloride was absorbed by poultry tissues following treatment of roosts with various formulations of the compound. The level of absorption was below the avg. threshhold of detection by taste and odor tests. Absorption was demonstrated following the use of either high gamma prepns. or a mixture of the isomers of benzene hexachloride. Absorption was not demonstrable by bioassay following roost treatments of material containing 0.5% gamma isomer except for a very slight amt. present in the skin of one bird. When formulations containing 1.2 to 2.4% gamma isomer were used, absorption was demonstrated in skin, flesh and liver. Although chickens were continuously exposed to treated roosts, their tissues lost their toxicity, as measured by bioassay, within 3-6 wks. following roost treatment, except in one instance where a slight residual was detected in the skin.—*D. P. Furman.* (Biological Abstracts)

GUAITA, HECTOR E., and AMELIA R. ROINO. LA CARNE EN POLVO: SU VALOR NUTRIVO. INDICACIONES DE SU APLICACION. RECETAS DIETETICAS. *Rev. Asoc. Argentina Dietol. 7:* 33-45, 1949.—Analytical data on the flesh of the chicken and a number of recipes are given. Chicken flesh contains 77.62 g. protein, 13.23 g. fat, 8.01 g. moisture, 12.977 mg. of iron, and 429.55 calories per 100 g. The percentages of amino acids in the protein of chicken flesh are as follows: arginine 4.89-6.28; phenylalanine 3.10-3.88; histidine 1.47-1.78; isoleucine 2.48-2.79. leucine 8.53-10.24; lysine 5.12-6.67; methionine 2.25-2.71, cystine 0.62-1.08; tyrosine 2.17-2.63; threonine 3.80-4.42; tryptophan 0.77-1.08; and valine 2.32-2.94.—*E. L. Sexton.* (Biological Abstracts)

HANSON, HELEN L., LEO KLINE, and HANS LINEWEAVER. *(Western Region. Res. Lab., Albany, Calif.)* APPLICATION OF BALANCED INCOMPLETE BLOCK DESIGN TO SCORING OF TEN DRIED EGG SAMPLES. *Food Technol. 5:* 9-13. 1951.—The usefulness of a balanced incomplete block design in judging flavor differences is described for conditions when the number of samples to be compared is larger than can be judged reliably at one time. (Biological Abstracts)

HAWTHORNE, J. R. *(U. Cambridge, Eng.)* THE ACTION OF EGG WHITE LYSOZYME ON OVOMUCOID AND OVOMUCIN. *Biochem. et Biophs. Acta 6:* 28-35. 1950.—When ovomucoid prepns. were incubated with egg white lysozyme, no increase in reducing substances, decrease in viscosity or production of amino sugars was observed. Addition of lysozyme to swollen ovomucin resulted in the separation of a compact precipitate of mucin plus lysozyme. The data suggest that the thinning of the thick white gel which occurs during storage of eggs may, in part, be due to the action of lysozyme on mucin.—*T. E. King.* (Biological Abstracts)

HEFFNER, M. C., and H. BARTH. *(Amer. Inst. Radiation, Belmont, Calif.)* IRRADIATION A NEW PROCESSING METHOD. *Amer. Egg and Poultry Rev. 11:* 12-14. 1950.—In the preliminary expts. irradiation increased the quality storage life of eggs.—*H. G. Lindquist.* (Biological Abstracts)

HOOD, MAUDE PYE, ROBERT S. WHEELER, and JOSEPHINE B. McGLAMERY. *(U. Georgia, Athens.)* OXIDATIVE CHANGES IN ESTROGEN-STIMULATED FAT AND THE INFLUENCE OF NATURAL TOCOPHEROLS ON STABILITY OF FATS IN NORMAL CHICKENS. *Poultry Sci. 29:* 824-828. 1950.—Estrogen-treated birds deposited significantly higher percentages of fat and the fat exhibited less change in Kreis and peroxide numbers during storage periods than did the fat of the other birds. Kreis and peroxide values indicated that the birds on diets which included 5% peanut oil as a natural source of tocopherols deposited fat which was slightly less susceptible to oxidative changes than did the fat of birds on diets containing 5% peanut oil from which the tocopherols had been extracted by $FeCl_3$. Dripping losses during cooking were in direct relation and evaporation losses in inverse relation to the percent of body fat. Organolepticaly, both the estrogen-treated group and the group receiving tocopherol supplement were scored higher in tenderness than was the control group; flavor of the estrogen-treated birds was rated significantly lower than that of the other 2 groups. —*R. S. Wheeler.* (Biological Abstracts)

JAAP, R. GEORGE, M. M. RENARD, and R. D. BUCKINGHAM. *(Ohio State U., Columbus.)* DRESSED AND EVISCERATED MEAT YIELDS FROM CHICKENS AT TWELVE WEEKS OF AGE. *Poultry Sci. 29:* 874-880. 1950.—1824 chickens of 44 different breeds and crosses involving inbred and non-inbred ancestry were slaughtered at 12 wks. of age. Size was the major factor affecting meat yield. 91.3% of the live wt. minus 0.07 lb. predicted the dressed, and 72.7% of the live wt. minus 0.02 lb. predicted the eviscerated yield. On removal of the influence of live wt., statistically significant differences were demonstrated between the yields of some of the breeds and crosses. Plymouth Rocks yielded a higher dressed wt. than that expected on a basis of their live wt. Factors having no influence other than their possible effect on size were: percentage of adult wt. attained by 12 wks., inbred ancestry, sex-linked early feathering and fatness. Exceptional plumpness may increase meat yields within a given live wt. group.—*R. G. Jaap.* (Biological Abstracts)

JOHNS, C. K., and J. G. DESMARAIS. THE BURRI SLANT METHOD IN THE BACTERIOLOGICAL CONTROL OF FROZEN EGG. *Food Technology 5:* 36, January 1951.—The Burri slant method proved valuable in plant sanitation control, and as a sorting test for estimating compliance with bacteria count standards for frozen egg. (Experiment Station Record)

KAHLENBERG, O. J., M. M. LALLY, and J. M. GORMAN. WHAT IS THE RIGHT WAY TO DRILL FROZEN EGGS? *U. S. Egg and Poultry Mag. 56:* 14-15, 28. 1950.—This is a preliminary report on various methods of sampling frozen eggs. Five different samples are taken and solids content and number of bacterial colonies determined for each of the different samples. Results of these tests are given in tabular form. A later report will summarize these and subsequent samples.—*G. W. Newell.* (Biological Abstracts)

KAPLAN, ARTHUR, M., MATHILDE SOLOWEY, WILLIAM W. OSBORNE, and HASKELL TUBIASH. *(Agric. Res. Center, Beltsville, Md.)* RESTING CELL FERMENTATION OF EGG WHITE BY STREPTOCOCCI. *Food Technol. 4:* 474-477. 1950.—The use of streptococci in a resting state appears to hold promise as a pure culture method for the fermentation of egg white prior to drying. The egg white is rapidly fermented; proteolysis does not occur; no off odors or flavors are apparent; and the growth of organisms known to cause undesirable fermentations is suppressed. Under the conditions of the process, a flexible

fermentation program is made possible and a dried albumen varying in range from acid to near neutrality can be prepared as desired. Pan-dried albumen prepared from the fermented white is of good quality and produces excellent angel food cakes.—*A. M. Kaplan.* (Biological Abstracts)

KLINE, L., and T. T. SONODA. ROLE OF GLUCOSE IN THE STORAGE DETERIORATION OF WHOLE EGG POWDER.—I. REMOVAL OF GLUCOSE FROM WHOLE EGG MELANGE BY YEAST FERMENTATION BEFORE DRYING. *Food Technology 5:* 90, March 1951.—This paper describes factors requisite to the preparation of an organoleptically acceptable glucose-free whole egg powder by resting-cell yeast fermentation. (Experiment Sation Record)

LORENZ, F. W. BLACK LIGHT. *Amer. Egg and Poultry Rev. 11:* 16, 18. 1950.—U.-v. is used in the egg packing industry to detect washed eggs and sour eggs (eggs infected with *Pseudomonas* organisms) before they are put in storage. Sour eggs show a brilliant green fluorescence when illuminated with u.-v. It is an inferior instrument for detecting blood spots compared to regular light and it does not work as well on brown as on white shelled eggs, but investigations are underway to improve the instrument. *H. G. Lindquist.* (Biological Abstracts)

LORENZ, F. W., PHOEBE BETTY STARR, and R. BOUTHILET. *(U. California, Davis.)* FUMIGATION OF SHELL EGGS WITH ETHYLENE OXIDE. *Poultry Sci. 29:* 545-547. 1950.—Ethylene oxide gas employed as a fumigant affords almost complete protection to previously infected eggs during a period and under storage conditions in which similarly infected unfumigated eggs develop a high percentage of spoilage.—*F. W. Lorenz.* (Biological Abstracts)

MILLER, C., and A. R. WINTER. PASTEURIZED FROZEN WHOLE EGG AND YOLK FOR MAYONNAISE PRODUCTION. *Food Research 16:* 43, Jan.-Feb., 1951.—Pasteurization of whole egg and yolk for four minutes at temperatures ranging from 140 to 146°F. (60.0 to 63.3°C.) before freezing did not impair their value for making mayonnaise under the conditions tested when judged by consistency, stability, and palatability of the stored product.

Mayonnaise made with 13.5 percent defrosted plain yolk was too stiff to be readily acceptable by a panel of judges.

As the percent of defrosted yolk in mayonnaise was decreased from 13.5 percent to 5.5 percent, the stiffness and stability of the mayonnaise declined. (Experiment Station Record)

MORRIS, R. B. EGG PRODUCTS CAN COMPETE WITH SUBSTITUTES. *U. S. Egg & Poultry Mag. 57:* 16, April 1951. (Experiment Station Record)

OGILVY, W. S., and J. C. AYRES. POST-MORTEM CHANGES IN STORED MEATS.—II. THE EFFECT OF ATMOSPHERES CONTAINING CARBON DIOXIDE IN PROLONGING THE STORAGE LIFE OF CUT-UP CHICKEN. *Food Technology 5:* 97, March 1951.—Atmospheres containing carbon dioxide have been shown to improve storage life of cut-up poultry at refrigeration temperatures above freezing. The effectiveness of carbon dioxide as measured by storage life of the chicken or by inhibition of slime-forming organisms was improved as the carbon dioxide concentration was increased or as temperature was reduced. (Experiment Station Record)

OTTE, A. W., J. WOLK, and E. H. McNALLY. *(U. S. Dept. Agric., Washington, D. C.)* COMPARISON OF RATE OF DETERIORATION OF STORAGE AND NONSTORAGE EGGS. *Amer. Egg and Poultry Rev. 11:* 82, 84. 1950.—Graphs showing the changes in weight and quality of storage and nonstorage eggs, during specified holding periods are given. Regardless of the length of time eggs had been in storage at 30°F., the same pattern of decline in quality changes occurred when they were taken out and held at 41, 59 and 77°F. Loss of wt. during subse-

quent holding periods following storage at 30°F. increased as temp. increased. Loss of quality and loss of wt. occurred at practically the same rate for both storage and nonstorage eggs that were of about the same quality at the time eggs were held at 41, 59 and 77°F.—*H. G. Lindquist.* (Biological Abstracts)

PEARCE, JESSE A. *(Nation. Res. Labs., Ottawa, Canada.)* FLUORESCENCE DEVELOPMENT IN EGG POWDER AND IN GLUCOSE-GLYCINE MIXTURES. *Indust. and Engineer. Chem. 41:* 1514-1517. 1949.—Fluorescence development in spray-dried egg powder was observed to proceed according to kinetic equations for a normal, first-order reaction with a heat of activation of 28 kg.-cal. and an autocatalytic, first-order reaction with a heat of activation of 5 kg.-cal. The heat of activation for fluorescence development in a mixture of 2 g. of glucose and 1 g. of glycine, exposed to relative humidities of 75 or 100%, or dissolved in 3 ml. of water was 26 kg.-cal. and was reduced by decreasing the relative humidity or by increasing the dilution.—*C. R. Thompson.* (Biological Abstracts)

PINO, JOHN A. *(New Jersey Agric. Expt. Sta., New Brunswick.)* EFFECT OF WASHING WITH A HOT DETERGENT SOLUTION ON KEEPING QUALITY AND HATCHABILITY OF EGGS. *Poultry Sci. 29:* 888-894. 1950.—Eggs dipped momentarily in a detergent soln. at 140°F., sprayed with high pressure water at 140°F. and forced air dried showed no deterioration in interior egg quality as measured by albumen and yolk index. Hatching eggs similarly treated and held for 2 weeks were not different from the controls with respect to apparent fertility, embryo mortality and hatchability.—*J. A. Pino.* (Biological Abstracts)

STADELMAN, W. J., and R. A. WILCOX. *(Washington State Coll., Pullman.)* THE EFFECT OF THIOURACIL AND DIETHYLSTILBESTROL TREATMENT OF TURKEYS ON STORAGE QUALITY OF THE MEAT. *Poultry Sci. 29:* 625-627. 1950—Thiouracil and diethylstilbestrol used separately and in combination for finishing turkeys had no apparent effect on the keeping qualities of fat on Broad Breasted Bronze turkeys kept in frozen storage for 13 months. Taste and odor tests were made on roasted turkeys. Peroxide values by the Wheeler iodometric method on cooked and raw (cold ether extracted in Waring blendor) fat for treated, control and freshly killed turkeys are given.—*R. A. Wilcox.* (Biological Abstracts)

WILLIAMS, I. L., and J. W. GOBLE. EGG WASHING STUDIES. *63rd Annual Report of Nebraska.* May 1950. p. 126.—Soiled eggs were prepared by wetting clean eggs and rolling them on the hen house floor until they were completely covered. The soiled eggs were then allowed to stand for 24 hours at room temperature (approximately 70°F.) before treatment.

For washing, the eggs were placed in a container, covered with washing solution, and washed by hand until clean.

The washing solution contained a detergent (37 grams of Dreft to 3 gallons of water) to facilitate cleaning. All eggs were placed in storage at 30°F. and 85 to 90 percent relative humidity. All experimental lots contained 100 eggs each.

In the first experiment, designed to test the effect of washing solution temperature on keeping quality of eggs, one lot of dirty eggs was washed in cold water (68°F.), another lot was washed in warm water (88°F.), and a third lot was washed in hot water (130°F.). One lot of clean eggs (unwashed) was used as a control. Internal temperature of the eggs in the dirty lots at time of washing was 68°F.

In the second experiment, designed to study the effect of variation in interval between time of soiling and washing, lots of dirty eggs were washed one, two, three, four, five, six and seven days after becoming soiled. At the time of washing, the internal temperature of the eggs was 44°F., and the water temperature was 88°F.

Following treatment the eggs were placed in storage. One-half of

each lot was removed after seven months and the other half after nine months. Quality was determined by breaking the eggs individually.

Analysis of variance of the data obtained revealed no differences between lots in either the first or second experiment that could be attributed to any treatment. (Experiment Station Record)

WINTER, A. R. NOW—THE CONSUMER FROZEN-EGG PACK. *Food Industries 23:* 80, February 1951.—Consumer-size packages for frozen whole eggs, or separate whites, are being tested at Ohio State U. Under scrutiny are small-size metal cans, freezer jars, and souffle cups. Project is aimed at expanding markets for frozen egg products. (Experiment Station Record)

ANONYMOUS. NEW DANISH MACHINE FAST STAMPER-GRADER. *Amer. Egg and Poultry Rev. 11:* 12-13. 40. Illus. 1950.—A new egg grading machine weighs, stamps and grades eggs automatically. —*H. G. Lindquist.* (Biological Abstracts)

MANAGEMENT

BAROTT, H. G., L. SCHOENLEBER, and L. E. CAMPBELL. *(United States Dept. Agric., Beltsville, Md.)* THE EFFECTS OF ULTRAVIOLET IRRADIATION AT 2587 ANGSTROM UNITS ON THE EGG PRODUCTION OF HENS. *Poultry Sci. 29:* 747. 1950.—*An abstract.* (Biological Abstracts)

GARTLEY, K. M., J. D. McCONACHIE, and J. R. CAVERS. *(Ontario Agric. Coll., Guelph.)* THE INFLUENCE OF TIME ON TRANSFER ON THE HATCHABILITY OF TURKEY EGGS. *Poultry Sci. 29:* 758-759. 1950.—*An abstract.* (Biological Abstracts)

HALBROOK, E. R., A. R. WINTER, and T. S. SUTTON. *(Ohio State. U., Columbus.)* A STUDY OF THE MICROFLORA OF POULTRY HOUSE LITTER AS RELATED TO MANAGEMENT AND THE IN VITRO PRODUCTION OF VITAMIN B_{12} BY ISOLATED MICROORGANISMS. *Poultry Sci. 29:* 761. 1950.—*An abstract.* (Biological Abstracts)

HALBROOK, E. R., A. R. WINTER, and T. S. SUTTON. *(Ohio State U., Columbus.)* THE VITAMIN B_{12} CONTENT OF POULTRY HOUSE LITTER AS AFFECTED BY MANAGEMENT AND ITS RELATION TO CHICK ASSAY RESULTS. *Poultry Sci. 29:* 761. 1950. —*An abstract.* (Biological Abstracts)

HANSEN, R. S. POULTRY LITTER PROBLEM. *Flour & Feed 51:* 42, April 1951.—Locating mash feeders and waterers on the roost racks reduced the wet litter problem and made it easier to work with the litter.

Sixty percent less lime and 38 percent less labor to maintain the litter in the pen with the feed troughs on the roost racks, as compared with the pen where the feed troughs stood out in the litter area. The unobstructed floor made the work easier as well as quicker, according to the fellows who took care of the litter. (Experiment Station Record)

HAYS, F. A. *(U. Massachusetts, Amherst.)* TEMPERATURE AND RELATIVE HUMIDITY IN THE INCUBATOR ROOM AND EMBRYONIC MORTALITY. *Poultry Sci. 30:* 151-152. 1951.—During a 5-yr. period the effects of room temp. and relative humidity on the operation of a forced draft electric incubator were studied in relation to embryonic mortality. The results indicated that a change in room temp. from 70.8° to 74°F. had no significant effect on embryonic mortality. —*F. A. Hays.* (Biological Abstracts)

HUTCHISON R. S., D. T. KINARD, and EDMUND HOFFMAN. *(U. Georgia, Athens.)* A DESIGN FOR A FARM HATCHING EGG COOLER AND RELATIVE HUMIDITY AT 55°F. AS A FACTOR IN ITS OPERATION. *Poultry Sci. 29:* 533-538. Illus. 1950.—A holding temp. of 55°F. gave a hatch of 78% compared to a hatch of 55% for a basement temp. of 75-85°F. when eggs were held for 14 days. It was then assumed that a holding temp. of 55°F. was optimum. Eggs were held at that temp. for 14 days but with humidity varying from 45 to 88% for the different lots. The relative humidity had no effect on % of hatchability although it did affect the rate of evaporation of moisture from the eggs. The authors concluded that relative humidity was of little importance in the holding of hatchery eggs for conditions under which they worked.—*Lawrence Morris.* (Biological Abstracts)

JONES, D. G., and WM. KOHLMEYER. *(South Dakota State Coll., Brookings.)* THE EFFECT OF DUBBING WHITE LEGHORN FEMALES UPON EGG PRODUCTION. *Poultry Sci. 29:* 765. 1950.—*An abstract.* (Biological Abstracts)

KENNARD, D. C., and V. D. CHAMBERLAIN. *(Ohio Agric. Experiment Station, Wooster.)* GROWTH, DIETARY REQUIREMENTS AND MORTALITY OF CHICKENS AS AFFECTED BY MANAGEMENT OF THE FLOOR LITTER. *Poultry Sci. 29:* 766. 1950.—*An abstract.* (Biological Abstracts)

KENNARD, D. C., and V. D. CHAMBERLAIN. *(Ohio Agric. Expt. Sta., Wooster.)* GROWTH AND MORTALITY OF CHICKENS AS AFFECTED BY THE FLOOR LITTER. *Poultry Sci. 30:* 47-54. 1951.—Four years of extensive and repeated expts. clearly indicated the effectiveness of old built-up floor litter as a sanitary procedure especially for control of coccidiosis. 14 consecutive broods of chickens were successfully raised on the same built-up litter. A higher rate of growth was obtained from chickens on old built-up litter than from those on fresh litter or new built-up litter irrespective of the diets employed. The synthesis of vit. B_{12} in old built-up litter enabled the chickens to make a satisfactory rate of growth when fed an all-plant diet, whereas, the chickens that received the same diet on fresh litter or new built-up litter made a poor rate of growth with a high rate of mortality.—*D. C. Kennard.* (Biological Abstracts)

KOSIN, I. L. *(State Coll. Washington, Pullman.)* A RELATIONSHIP BETWEEN THE LENGTH OF STORAGE AND INCUBATION PERIODS IN BROAD BREASTED BRONZE EGGS. *Poultry Sci. 29:* 620-621. 1950.—Data are presented indicating that the storing of Broad Breasted Bronze eggs for 4-8 days lengthens their incubation period as compared with that of the eggs stored for only 1-2 days. Paralleling this, there is a trend toward lowered hatchability in the eggs stored beyond the first 48 hrs. after oviposition.—*Authors.* (Biological Abstracts)

WHEELER, ROBERT S., and EDWARD CLARK JAMES, JR. *(U. Georgia, Athens.)* THE PROBLEM OF WET POULTRY HOUSE LITTER: INFLUENCE OF TOTAL DIETARY PROTEIN AND SOYBEAN MEAL CONTENT ON WATER INTAKE AND URINARY AND FECAL WATER ELIMINATION IN GROWING CHICKENS. *Poultry Sci. 29:* 496-500. 1950.—In 2 expts. with growing chickens total dietary protein and protein from soybean and animal sources were investigated as factors influencing water intake and urinary and fecal water elimination. Although the quantitative effects of soybean meal were greater than those of fish and meat protein, increasing the amts. of either or both of these substances in the diet was followed by: (1) an increase in water intake, (2) an increase in the amts. of cloacal excreta voided, and thus an increase in the total amt. of water eliminated in the droppings. Neither moisture content of the droppings nor food intake appeared to have been affected. By virtue of their effects of increasing water elimination, both dietary soybean meal and animal protein are possible factors in the production of "wet litter" in poultry houses.—*R. S. Wheeler.* (Biological Abstracts)

WILSON, WILBOR O., and WILLIAM H. EDWARDS. *(U. California, Davis.)* TEMPERATURE, OXYGEN AND CARBON DIOXIDE INSIDE CHICK BOXES AT VARIOUS ROOM TEMPERATURES. *Poultry Sci. 29:* 852-857. 1950.—Day-old White Leghorn cockerel chicks were placed in chick shipping boxes and observations were made on internal temp., CO_2 and O_2 at room temps. of 72°, 90° and 100°F. Neither the lack of O_2 nor the accumulation of CO_2 was found to be a factor in mortality of the chicks. Temps. in excess of 106°F inside the boxes resulted in mortality. This internal temp. was reached when the room temp. was 100°F.—*W. O. Wilson.* (Biological Abstracts)

Note:

The Experiment Station Record, published by the Office of Experiment Stations, United States Department of Agriculture, was discontinued as a publication several years ago. References to "Experiment Station Record" in some of the items of this abstract material, therefore, refer not to the publication of this name but to the records kept by the Office of Experiment Stations.

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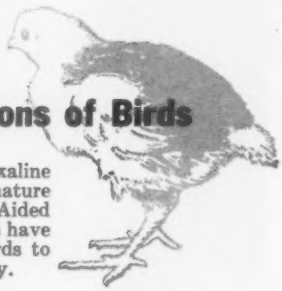
Prevents and Controls } Coccidiosis Outbreaks



Proved in Hundreds of Millions of Birds

During the past few years, Sulfaquinoxaline has saved millions of birds from premature death or stunting due to coccidiosis. Aided by this effective agent, poultry growers have been able to raise production standards to new high levels of quality and quantity.

ADDED TO POULTRY FEEDS OR DRINKING WATER, SULFAQUINOXALINE AFFORDS:

PREVENTION AND CONTROL of outbreaks of cecal and intestinal coccidiosis of chickens and coccidiosis of turkeys; checks immediate mortality in acute fowl cholera of chickens, turkeys, and pheasants.

REDUCED MORTALITY. Sulfaquinoxaline has reduced coccidiosis deaths—from the previously considered "normal" rate of ten to twenty per cent—to approximately two per cent or less.

BETTER FEED EFFICIENCY. Published data show that Sulfaquinoxaline-fed broilers weigh more, and eat less feed per pound of gain, than untreated birds.

BETTER MARKET QUALITY. Flocks receiving Sulfaquinoxaline maintain better shank color, and complete feathering at an earlier age. Sulfaquinoxaline reduces the stunting which often follows coccidiosis.

SAFETY. Safe also for replacement pullets—no adverse effect on egg production, fertility, or hatchability. The safety margin of the drug exceeds many times the recommended therapeutic dosage.

CONSISTENT PERFORMANCE. No severe outbreaks of cecal or intestinal coccidiosis in 86 successive broiler flocks. There has been no evidence that the parasites become resistant to Sulfaquinoxaline.

VERSATILITY. Effective the year-round under a wide variety of climatic conditions.

PROTECTION. Sulfaquinoxaline helps birds to develop an immunity to the types of coccidia to which they are exposed.

Numerous published *reports by outstanding poultry authorities* attest to the effectiveness of Sulfaquinoxaline. Annotated bibliography and detailed literature on the use of Sulfaquinoxaline in feed or drinking water will be sent on request.

Sulfaquinoxaline products are supplied, under the labels of various manufacturers, in the form of feed mixtures, premixes, solutions, tablets, or soluble powder.

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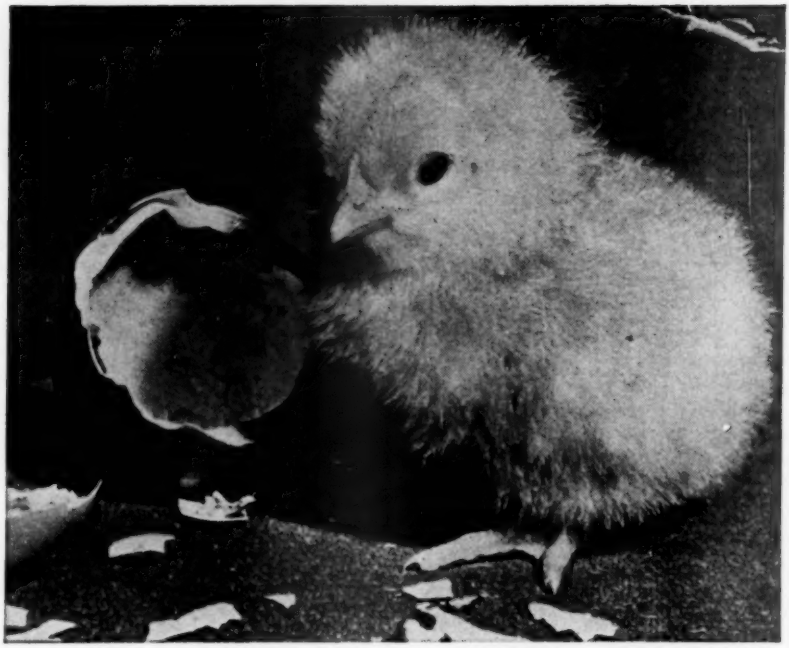

THE CHICK SEASON LASTS ALL YEAR AT BORDEN'S EXPERIMENTAL FARM

Incubation never stops at Borden's Experimental Laboratory and Farm at Elgin, Illinois. Each year thousands of baby chicks emerge from their shells to take important roles in Borden's poultry nutrition research and in the quality-control of Borden's Feed Supplements.

Borden is continually "asking the chicken" for the answers to more efficient and more economical nutrition.

The Borden Company

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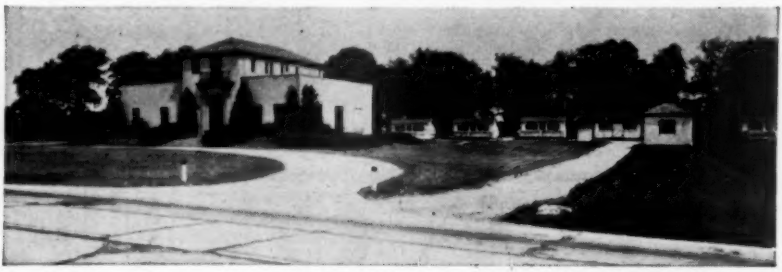

Poultry and Hog Raisers Strong in Praise of Manufactured Feeds That Contain

AUROFAC*

Vitamin B_{12} and Antibiotic Feed Supplement

Supplies Aureomycin and Factors from Aureomycin Fermentation Products

Remarkable increases in rate of growth, along with fine condition, of poultry and swine receiving feeds that contain recommended levels of AUROFAC Vitamin B_{12} and Antibiotic Feed Supplement are reported by leading farmers.

Richard Grabfelder, Etna Green, Indiana, states:

"I attribute the rapid growth and excellent fleshing of our leghorn cockerels to AUROFAC as incorporated in the Etna Broiler Ration. General health of the flock was very good with mortality below average. These cockerels were the finest chickens of any breed we have raised up to date."

Herschell O. Apple, Etna Green, Indiana, writes:

"This past year our turkey ration included AUROFAC. The flock developed into the finest flock we ever raised, and we have raised turkeys for eighteen years. Fleshing and growth were excellent—as was general health of the flock. Fourteen toms, hatched in late April, dressed out ready for the oven in early November with an average weight of 25½ pounds."

Alan J. McConnell, Fairbury, Illinois, writes:

"I first put my pigs on Honeggers' 35 Pig Popper containing AUROFAC on November 6, 1950. They had been farrowed over a four-week period, varied in size, and hadn't done as well as I thought they should. Following is a record of results to January 6, 1951:

No. Pigs	Av. Wt. Lbs. Nov. 6	Jan. 6	Net Gain Lbs.	Av. Daily Gain Lbs.	Total Feed** Lbs.	Lbs. Feed Per Lb. Gain	$ Cost Per 100 Lbs. Gain
121	68	174	106	1.74	47,716	3.65	11.59

**5,200 lbs. Pig Popper Hog Supplement Feed—42,516 lbs. corn

"Since November 6, these pigs grew faster and stayed in better general condition than any others I have ever raised. There were no losses during the entire 61 days."

AUROFAC Vitamin B_{12} and Antibiotic Feed Supplement contains 1.8 milligrams of vitamin B_{12} and 1.8 grams of aureomycin per pound along with valuable nutritional factors from aureomycin fermentation products. Remember that all antibiotics do not produce the same growth response.

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Animal Feed Department

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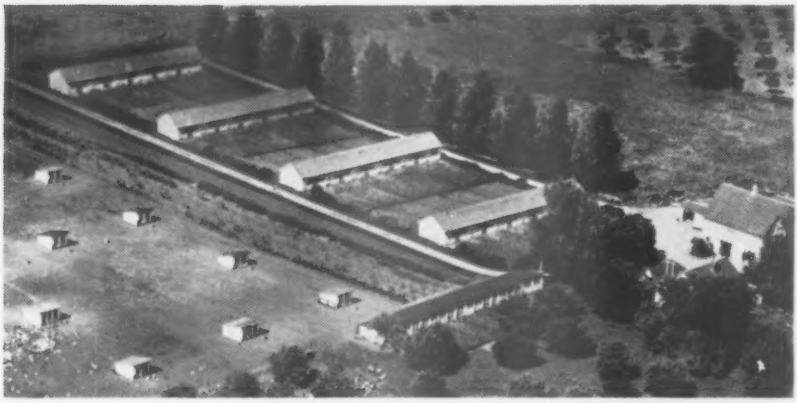
26 YEARS of progress by Ful-O-Pep Research builds more productive pullets!



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Egg production has doubled at the Ful-O-Pep Research Farm . . . increasing from a hen-housed average of 110 eggs per bird in 1926, to about 220 eggs this year. Mortality has been cut more than half in 26 years.

The restricted feeding plan for growing pullets, developed at the farm in 1933 has won wide recognition; offers the poultryman greater economy, higher production. Results of 11 years of egg-laying contests show that birds grown on Ful-O-Pep averaged laying the equivalent of 14 more 2-oz. eggs than birds grown on all other feeds.

The heavy grain feeding plan for layers, proved by Ful-O-Pep Research, enables the poultryman to save up to 20% on feed cost by feeding up to ⅔ of his home-grown grain with ⅓ Ful-O-Pep Egg-Breeder Mash.

You are invited to visit this practical farm at your convenience. We'll appreciate your comments and criticisms.

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Sources of Riboflavin

Deficiency Symptoms

Recommended Nutrient Allowances

Table for calculating Riboflavin content of B-Y Dried Fermentation Solubles

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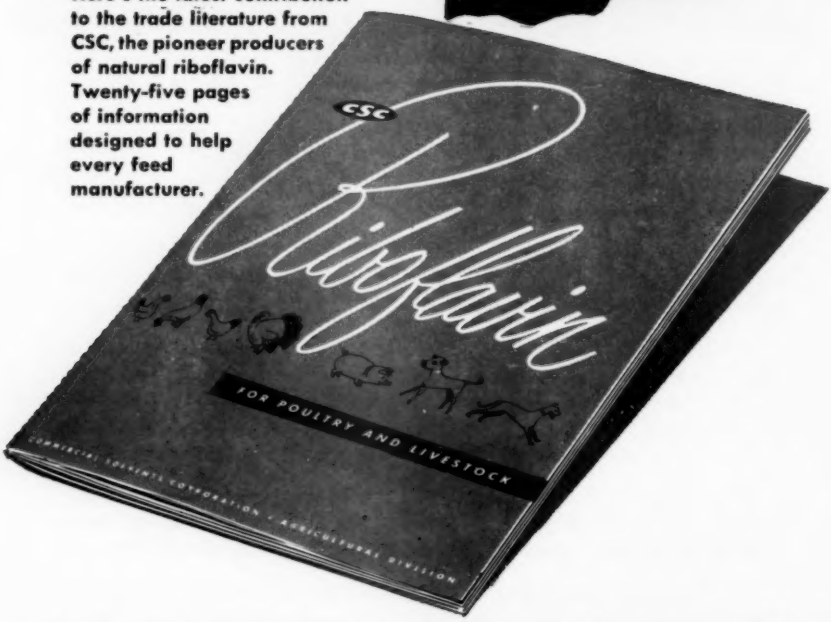

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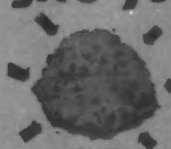
This vital 1 foot makes the other 4 feet pay off!

give your layers STONEMO hard grit



MINI-SIZE STONEMO HARD GRIT MAGNIFIED 4 TIMES

- to make better use of egg-laying ingredients
- to help maintain laying capacity
- to GRIND OUT MORE from every pound of feed

It takes more than good blood lines and high laying capacity to get high egg production.

When you place your pullets in the laying houses this Fall, use one foot of grit hopper to every four feet of feed hopper. It's this one foot that makes the four feet pay off for you —by helping to grind out more eggs per pound of feed!

The tough, sharp, extra grinding surfaces on STONEMO do just that: grind feed—make feed nutrients available so that birds can use them more effectively to produce eggs.

STONEMO is hard, insoluble granite. It will not dissolve in the bird's gizzard—will not upset mineral balance of rations.

Safeguard your investment in high capacity layers. Increase egg production per pound of feed and save feed costs! Include STONEMO in your feeding program. Get it from your feed or poultry supply dealer.

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